Canyonville/Canyon Creek Watershed Analysis

Roseburg District
South River Resource Area

Draft May 7, 1998

Revised December 3, 1998

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Characterization

The Canyonville/Canyon Creek WAU covers approximately 44,004 acres. The Bureau of Land Management (BLM) administers approximately 16,163 acres (37%) within the WAU. Bureau of Land Management administered lands are composed of Matrix, Late-Successional Reserve (LSR), and Riparian Reserve Land Use Allocations. Approximately 6,855 acres (42%) of BLM administered lands are available for intensive forest management. This would be about 16% of the WAU.

Approximately 630 acres per decade are estimated to be harvested on BLM administered lands within the Canyonville/Canyon Creek WAU. This would be about nine percent of the 6,855 acres considered available for harvesting within the WAU. Although, less than two percent of the Canyonville/Canyon Creek WAU would be harvested per decade.

Timber harvesting, agriculture, mining, and recreation have been the dominant human uses in the Canyonville/Canyon Creek WAU. The town of Canyonville is in the WAU.

The watershed analysis uses the format presented in the Ecosystem Analysis at the Watershed Scale, Federal Guide for Watershed Analysis. The Key Issues, Findings, and Recommendations and Restoration Opportunities are presented below.

Key Issues

The following issues and concerns were identified during the analysis.

•Management of the Late-Successional Reserve Land Use Allocation in the Canyonville/Canyon Creek WAU.

•The amount of timber harvesting in the past 30 years on BLM administered lands and fragmentation of suitable owl habitat.

•The amount of northern spotted owl dispersal habitat outside of the LSR in the Canyonville/Canyon Creek WAU.

•Vegetation condition in the Riparian Reserves.

•Water quality.

•The impacts roads have on streams due to sediment and road encroachment.

Findings

Vegetation

•Fifty-eight percent of BLM Administered Land in the WAU is within the Reserved or Withdrawn areas. Forty-two percent of the BLM Administered Land in the WAU is available for timber harvesting.

•Timber harvesting on BLM Administered Land would affect less than two percent (630 acres out of 44,004 acres) of the WAU per decade.

•Port-Orford Cedar is not known to occur in the Canyonville/Canyon Creek WAU.

•The 1987 Canyon Mountain Fire burned approximately 5,700 acres within the Canyonville/Canyon Creek WAU. The fire underburned some stands leaving them understocked and potentially uneconomical for timber harvesting. The burned area is a large area with the same stand age classes and continuous fuel types, which would affect land management within the WAU. The potential exists for a large fire to burn in this area again.

Hydrology and Fisheries

•Road densities range from 3.74 miles per square mile in the Canyon Pass Drainage to 8.60 miles per square mile in the Canyonville Drainage, which includes the town of Canyonville. The road density for the entire WAU is 5.29 miles per square mile.

•Main concerns are sediment in streams and water quality. High road densities, high stream crossing densities, and cumulative effects of harvesting in the past 40 years have probably increased peak flows and increased sediment in the streams.

•Some of the current water quality concerns are high temperatures, low flows, low dissolved oxygen levels, and sedimentation levels that do not meet state water quality standards.

•Sixteen of the Aquatic Habitat Inventory stream reaches surveyed were rated as fair. Four stream reaches were rated as poor and two stream reaches were rated as good.

Wildlife

Northern Spotted Owl

•There are 8,295 acres of BLM Administered Land in the Canyonville/Canyon Creek WAU considered to be suitable spotted owl habitat (Habitat 1 and 2).

•There are 14 spotted owl sites within the WAU. All 14 spotted owl sites are on BLM Administered Land. Eight sites on BLM Administered Land were active sites in 1997. Four spotted owl sites on BLM

administered lands are protected with 100 acre activity centers (core areas). Three spotted owl sites are in the LSR portion of the WAU.

Other Species of Concern

•There is habitat within the WAU that some Survey and Manage or Protection Buffer species may use.

Neotropical Birds

•Approximately 800 acres of private land, burned by the 1987 Canyon Mountain Fire, within the WAU were donated to the Roseburg District BLM in 1996. This area currently provides diverse habitats used by a number of neotropical birds. Surveys from 1996 to 1998, show 62 bird species are present in this area. Over half (62%) of the species are neotropical migrants.

Recommendations and Restoration Opportunities

Vegetation

•Conduct regeneration harvests on Matrix lands in conformance with the RMP.

•Manage young stands to maintain or improve growth and vigor and to improve stand structure and composition.

•Consider surveying stands underburned by the 1987 Canyon Mountain Fire and develop recommendations based on the information gathered. This work would be conducted as time and funding allowed.

Soils

•Category 1 Soils are highly sensitive soils formed from granitic parent materials and have slopes greater than 35 percent. Appropriate methods should be used for reducing vegetative competition on Category 1 Soils. Avoid broadcast burning on Category 1 Soils unless considered essential for resource management.

•Best Management Practices (BMPs) should be applied during all ground and vegetation disturbing activities. Along with the BMPs, the Standards and Guidelines brought forth from the Record of Decision (USDA and USDI 1994) should be implemented in order to achieve proper soil management. Best Management Practices should be monitored for implementation and effectiveness in order to document if soil goals are being achieved.

Hydrology

•Consider implementing bioengineering techniques with stream restoration opportunities.

•Consider classifying streams in the WAU using Rosgen stream classification.

•Consider collecting water quality data (such as pH, temperature, or dissolved oxygen) on BLM administered lands to determine if they are contributing to water quality concerns.

•When fertilizing, provide adequate buffers on streams and monitor fertilization activities to insure the fertilizer is not applied directly into streams or other bodies of water, especially those having a pH above 8.0, or if the fertilizer were to reach the stream indirectly, the pH and/or primary productivity of the stream would not be increased due to the fertilizer. These are important strategies to consider implementing in the Canyon Creek Subwatershed, which is a municipal watershed for Canyonville.

Fisheries

•Consider focusing watershed restoration on providing or improving fish passage at failed or failing stream crossings (especially in anadromous fish-bearing stream reaches) and renovating, upgrading, or decommissioning roads.

•In-stream structures and riparian improvement projects are other restoration activities that could be conducted in the WAU. Potential project areas for instream structure placement to enhance existing anadromous fisheries habitat are in the $SW^1/_4$ of Section 11, T31S, R5W on the mainstem of the West Fork of Canyon Creek. Projects in Section 15, T31S, R5W and Section 21, T31S, R5W on the mainstem of the West Fork of Canyon Creek would enhance existing resident fisheries habitat.

•Consider describing how projects within Riparian Reserves meet Aquatic Conservation Strategy objectives.

Wildlife

Northern Spotted Owl

•Consider planning so projects that modify or remove suitable owl habitat occur in areas outside of known territories first. Consider the rankings in Table 25 if modifying or removing suitable habitat in the Canyonville/Canyon Creek WAU.

•Consider the effects of timber harvesting on dispersal and critical habitat.

The Peregrine Falcon

•Consider continuing peregrine falcon habitat evaluation in the WAU.

Other Species of Concern

•Conduct surveys following established protocols to determine if the species are present in the WAU.

Neotropical Birds

•Consider scheduling management activities, such as burning, brushing, PCT, commercial thinning, timber harvesting, and other activities that remove or modify neotropical bird habitat so they do not occur during the breeding season, between April 1 and July 30 of any given year.

I. Characterization of the Watershed

The Canyonville/Canyon Creek Watershed Analysis Unit (WAU) is located in the southern portion of the South River Resource Area in the Roseburg District Bureau of Land Management (see Map 1). The WAU covers approximately 44,004 acres. Elevation ranges from about 640 feet where Cow Creek flows into the South Umpqua River to 3,973 feet at Silver Butte in the southwestern portion of the WAU. The town of Canyonville is located within this WAU.

This WAU lies within the South Umpqua Watershed (fifth field) and includes portions of two subwatersheds. These are the only areas within the South Umpqua Watershed (fifth field) not included in any previous watershed analysis. The portions of the two subwatersheds being analyzed for this watershed analysis contain eleven drainages. The subwatersheds and their drainages are listed below and shown on Map 2.

Canyon Creek Subwatershed- Drainages include Bear Gulch, Canyon Pass, Canyonville, Jordan Creek, Lower West Fork, South West Fork, and Upper West Fork.

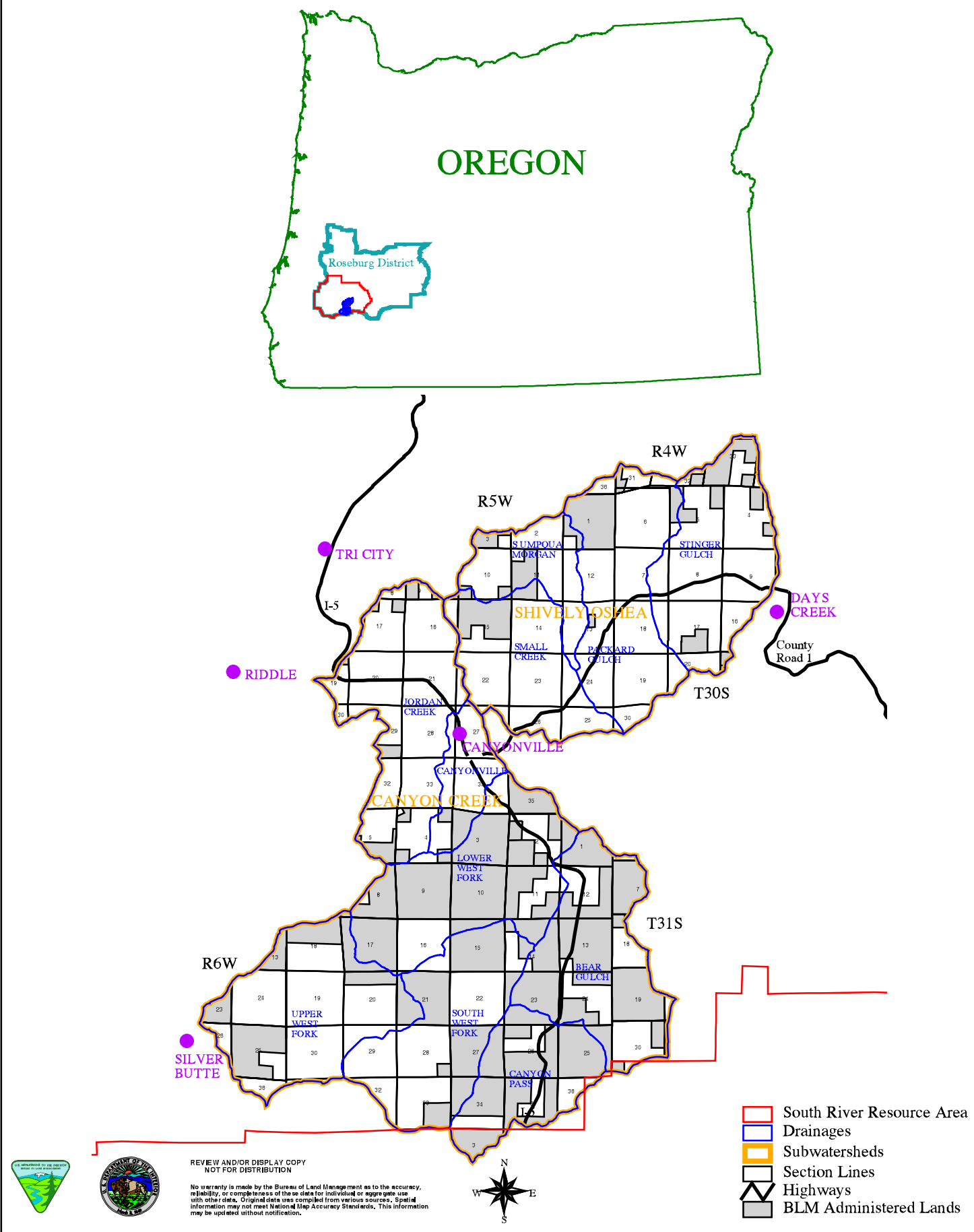
Shively-O'Shea Subwatershed - Drainages include Packard Gulch, South Umpqua Morgan, Small Creek, and Stinger Gulch.

The Bureau of Land Management (BLM) administers approximately 16,163 acres (37%) within the Canyonville/Canyon Creek WAU. The Roseburg District manages approximately 15,886 acres and the Medford District manages approximately 277 acres in the WAU. Bureau of Land Management lands are intermingled with private lands in a checkerboard pattern in the upland areas of the WAU. The South Umpqua River valley is mostly privately owned. Privately owned lands cover approximately 27,830 acres (63%) within the WAU.

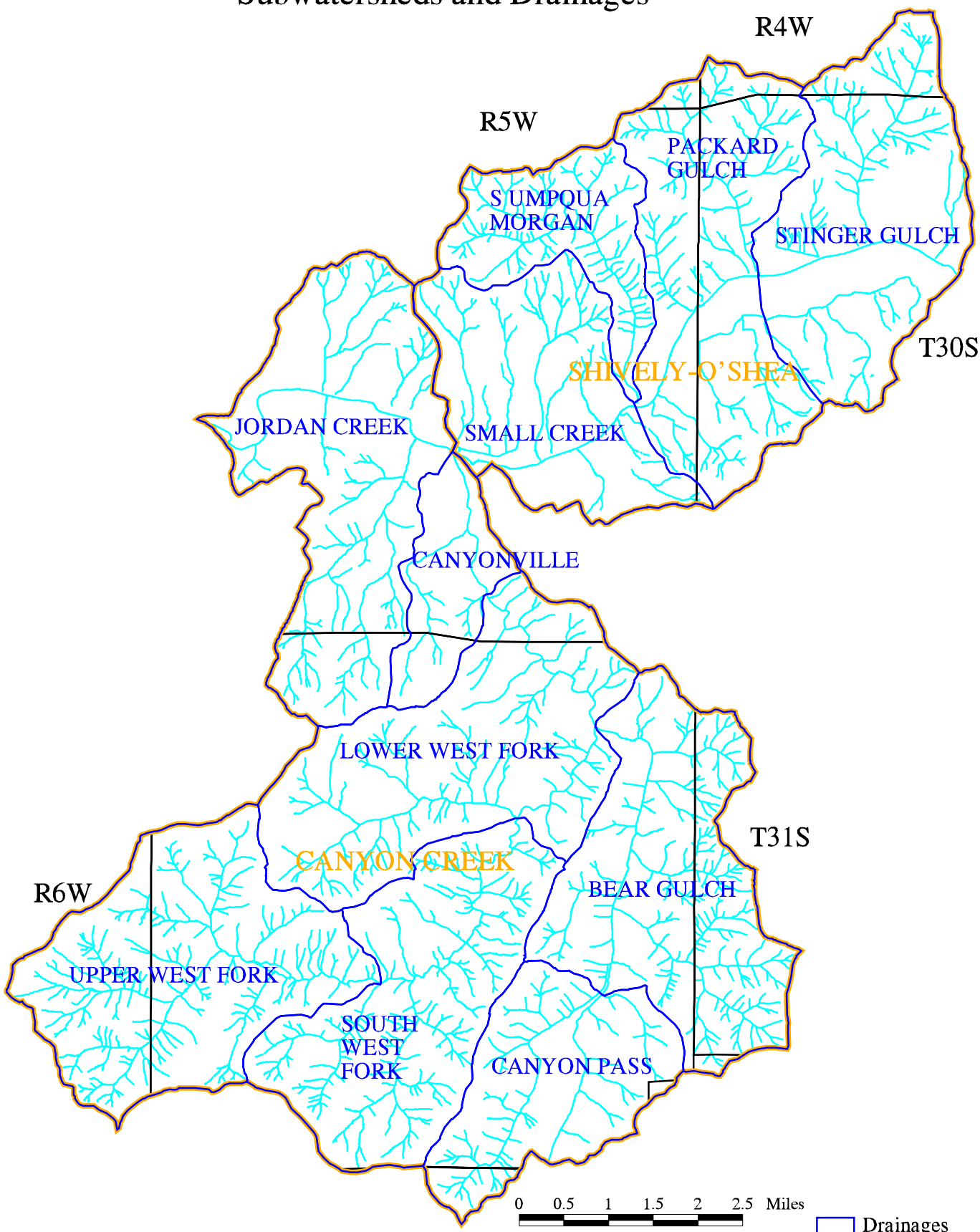
Bureau of Land Management administered lands are composed of Matrix, Late-Successional Reserve (LSR), and Riparian Reserve Land Use Allocations established in the Northwest Forest Plan (USDA and USDI 1994b) and the Roseburg and Medford District Resource Management Plans (RMP). Matrix lands are further delineated into General Forest Management Areas (GFMA), Northern General Forest Management Area (NFGMA) in the Medford District, and Connectivity/Diversity Blocks. The GFMA and NGFMA will be grouped and considered as GFMA in this watershed analysis. Map 3 and Chart 1 show the percentage of GFMA, Connectivity/Diversity Blocks, and LSR in the WAU and how they are distributed. Table 1 and Chart 2 show the number acres in each land use allocation.

The Canyonville/Canyon Creek WAU includes approximately 3,693 acres of the South Umpqua River/Galesville Late-Successional Reserve (LSR #RO223). The LSR is located east of I-5 in the southeastern part of the WAU. Late-Successional Reserves were established to protect and enhance conditions of late-successional and old-growth forest ecosystems. These ecosystems serve as habitat for animal and plant species that use old-growth forests.

Map 1. Vicinity Map
Canyonville/Canyon Creek Watershed Analysis Unit



Map 2. Canyonville/Canyon Creek Watershed Analysis Unit
Subwatersheds and Drainages



Map 3. Canyonville/Canyon Creek Watershed Analysis Unit Land Use Allocations

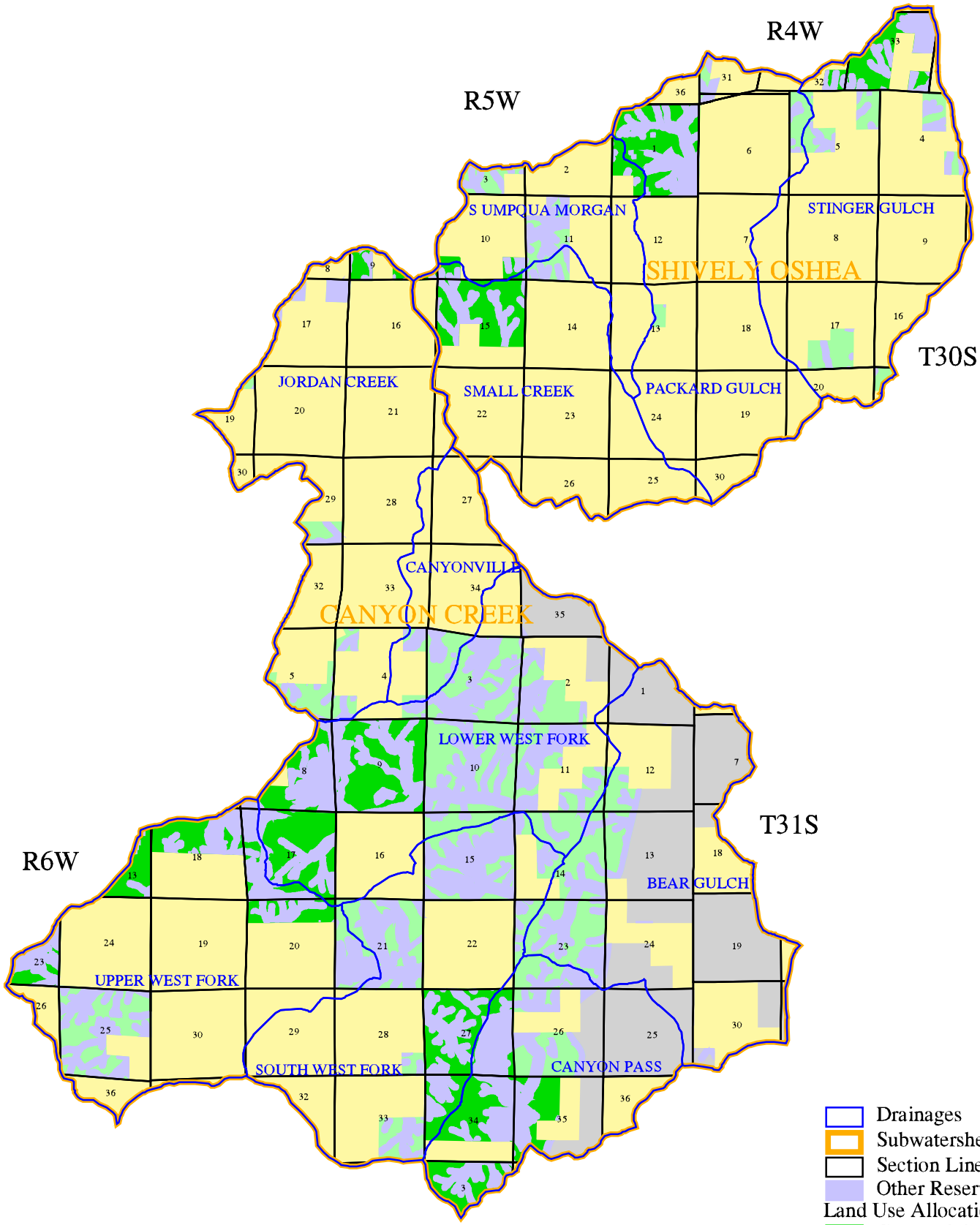


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Chart 1. Canyonville/Canyon Creek WA

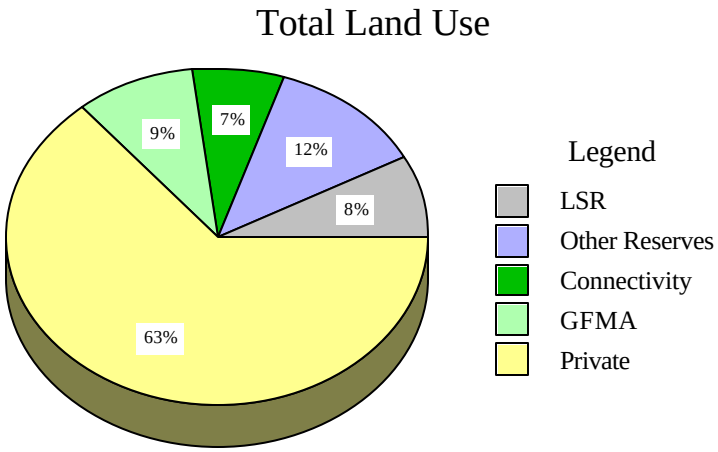
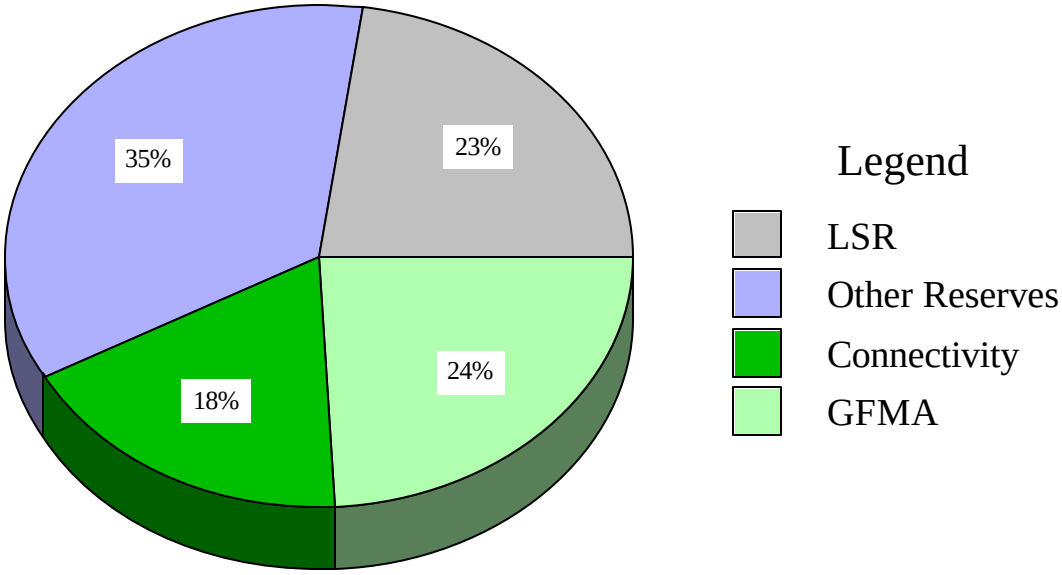


Table 1. Acres and Percentage of Federally Managed Lands by Land Use Allocation.

Land Use Allocation	Acres in Roseburg District	Acres in Medford District	Total Acres of Federally Managed Lands	Percent of Federally Managed Lands	Percent of Watershed Analysis Unit
Late-Successional Reserve	3,693	30	3,723	23	8
Riparian Reserves (outside of LSR)	3,948	99	4,047	25	9
Other Reserved Areas (Owl Core Areas and TPCC Withdrawn Areas)	1,538	0	1,538	10	3
Connectivity/Diversity Blocks	2,797	142	2,939	18	7
General Forest Management Area (GFMA)	3,910	6	3,916	24	9
Total	15,886	277	16,163	100	37

Chart 2. Canyonville/Canyon Creek WA

Federal Land Use Allocations



II. Issues and Key Questions

The purpose of developing issues is to focus the analysis on the key elements of the ecosystem that are most relevant to the management questions, human values, or resource conditions within the WAU. Areas covered by this watershed analysis will receive more in-depth analysis during project development and the National Environmental Policy Act (NEPA) process. New information gathered during the Interdisciplinary (ID) team process would be appended back to the watershed analysis document as an update.

A. ISSUE 1 - Late-Successional Reserve

Late-Successional Reserves are to be managed to maintain a functional and interacting late-successional and old-growth forest ecosystem. A Late-Successional Reserve Assessment would guide the management of the LSR but should be coordinated with watershed analysis.

1. Key Questions

a. Vegetation Patterns

What are the natural and human causes of changes between historic and current vegetation conditions?

Where are the late-successional/old-growth stands within the WAU?

Where are the stands that may be treated to maintain or promote late-successional habitat within the LSR?

Where should risk reduction activities occur to protect late-successional/old-growth forests?

B. ISSUE 2 - Harvest Potential

Matrix lands are responsible for contributing to the Probable Sale Quantity (PSQ). Objectives in the Matrix include producing a sustainable supply of timber and other forest commodities, providing connectivity (along with other land use allocations such as Riparian Reserves) between Late-Successional Reserves, providing habitat for a variety of organisms associated with both late-successional and younger forests, providing for important ecological functions such as dispersal of organisms, carryover of some species from one stand to the next, and maintenance of ecologically valuable structural components such as down logs, snags, and large trees, and providing early-successional habitat.

1. Key Questions

a. Vegetation Patterns

What are the historic and current vegetation conditions?

Where are the stands of harvestable age within the Matrix?

How can the scale, timing, and spacing of harvest areas be adjusted to minimize fragmentation and maintain the function of large forest blocks?

What opportunities are there in the Elk Management Areas to improve elk habitat through vegetation manipulation?

b. Special Status Species

What is the distribution of species of concern that are important in the WAU (e.g., threatened or endangered species, special status species, or species emphasized in other plans)? What is the distribution and character of their habitats?

How can scheduling of potential harvest areas be prioritized to minimize impacts to wildlife and hydrologic processes while still meeting the objectives for Matrix lands established in the SEIS ROD and the Roseburg District RMP?

C. ISSUE 3 - Watershed Health and Restoration

The first component of a watershed restoration program involves road treatments (such as decommissioning or upgrading), which will result in reduced sedimentation, reduced erosion, and improved water quality. The second component deals with riparian vegetation. Silvicultural treatments such as planting unstable areas along streams, thinning densely-stocked young stands, releasing young conifers overtopped by hardwoods, and reforesting shrub and hardwood dominated stands with conifers, would improve bank stabilization, increase shade, and accelerate recruitment of large wood desirable for future in-stream structure. The third watershed restoration component involves the design and placement of in-stream habitat structure in an effort to increase channel complexity and the number of pools.

1. Key Questions

a. Vegetation Patterns

What is the array and landscape pattern of plant communities and seral stages in the WAU (riparian and non-riparian) and what processes caused these patterns?

How are Riparian Reserves functioning within the WAU?

b. Soils / Erosion

What are the dominant erosion processes within the WAU and where have they occurred or are likely to occur?

c. Hydrology / Channel Processes

What are the dominant hydrologic characteristics (e.g. total discharge, peak flows, and minimum flows) and other notable hydrologic features and processes in the WAU?

d. Water Quality

What are the limiting factors affecting water quality, and where are the priority opportunities to improve water quality and hydrologic conditions?

What beneficial uses dependant on aquatic resources occur in the WAU and which water quality parameters are critical to these uses?

e. Fisheries

Where are the locations of fish populations, historic and existing?

How have fish habitat and fish populations been affected by hydrologic processes and human activities?

What and where are the priority restoration opportunities to benefit fisheries?

III. / IV. Reference and Current Conditions

A. Human Uses

1. Reference Conditions

The area included in the Canyonville/Canyon Creek Watershed Analysis Unit has been used by humans for probably thousands of years. Uses of the WAU have included hunting and gathering, fur trapping, subsistence and commercial agriculture, transportation, logging and lumbering, mining, and recreation.

Little knowledge exists of prehistoric use within the WAU prior to the arrival of European-Americans. One archaeological site has been recorded along the West Fork of Canyon Creek on BLM administered land. No sites have been recorded on private land within the WAU.

The indigenous people of the area, the Cow Creek Indians, followed a seasonal way of life utilizing a variety of plant and animals hunting deer and elk, gathering nuts, berries, seeds, and roots, and fishing for salmon. The Cow Creek Indians changed the landscape very little, although they may have burned areas to control brush for hunting and to aid in the collection of seeds for food.

a. Exploration and Settlement

The 1800s marked the arrival of fur trappers and settlers into the Canyonville and Canyon Creek area. Settlers transformed the life and countryside of the area and began the process of shaping it into its current conditions. Exploration by fur trappers from the Hudson Bay Company began around 1820. The presence of gold brought miners to Southern Oregon by 1851. Mining was a minor activity in the WAU. Although, mining activity on Cow Creek and tributaries of the upper South Umpqua River drew miners to the region. The primary period of settlement in the Watershed Analysis Unit was between 1850 and 1900.

Lindsay Applegate, along with others, surveyed the area in 1846. They were searching for a new route emigrants from the south, bound for the Willamette Valley, could use. This event along with the passage in 1850 of the Donation Land Claim Act opened the region to settlers. John Fullerton, J. F. Gazley, S. B. Briggs, I. Boyle, and Mr. Beckworth settled in the Canyonville area in 1851. Canyonville consisted of a log house and a blacksmith shop in 1852. By 1858 the town had two mercantile stores. In 1862, a telegraph line between Portland and Canyonville linked the region to the rest of the United States. Canyonville continued to grow and by 1883 had a drug store, a butcher shop, a grain warehouse, three hotels, two feed stables, two blacksmith shops, a hardware and tin shop, a cabinet shop, a wagon shop, and A. F. Schultz operated a grist mill (Walling 1884). Canyonville was incorporated in 1901 and had grown to a population of 1,260 by 1985.

b. Agriculture/Grazing

The early settlers maintained a subsistence lifestyle until markets were established for grain and livestock. These were the main sources of income throughout the 1880s and 1890s. Products were transported to markets by pack animals or wagon and the cattle were driven to market. The Oregon and California railroad was completed as far as Riddle in 1882, opening a new means of transportation to the north. By 1889, completion of the railroad south of Riddle allowed access to markets in Southern Oregon and California.

The introduction of rail service allowed agriculture to have a larger influence on the local economy. Italian Prunes were the main agricultural production crop in the area from the 1880s until the 1930s. Orchards located in the valleys were accompanied by associated prune driers. Prune production declined in the 1930s, when sheep and cattle grazing became more prominent.

c. Transportation

The earliest trails through the region were created by the seasonal migration of the native people. A well-traveled route, running north and south through the WAU, developed after the arrival of European-Americans. A transportation route became established for other people to use, such as Ewing Young, who in 1837 drove 700 head of long horn cattle from California to the Willamette Valley (Poole 1968).

Congress approved funding for the Scottsberg-Camp Stuart Wagon Road with construction work being done from the 1850s to the 1870s. The work on the Applegate and Old Oregon-California Trail improved travel through the Umpqua Valley (Beckham 1986). In 1861, the California Stage Company of Oregon began operating a stage line from Sacramento to Portland. The stages ran seven days a week, April through December. The line operated 28 coaches and 30 stage wagons, utilizing 35 drivers and 500 head of horses. The stage line stopped in Canyonville, Roseburg and Oakland, Oregon. The stage line ceased operation by 1865 (Winther 1934).

The railroad reached Roseburg in 1872, providing transportation of goods and people to the north. Ten years later, in 1882, construction was completed to the community of Riddle. The steepness of the terrain prevented the construction of the rail line through Canyonville and along Canyon Creek. Instead, it followed Cow Creek south from Riddle. The completion of the O&C railroad in 1884 to Ashland opened the possibility of new markets for the products from Canyonville to the south (Beckham 1986).

State Officials approved construction of the Pacific Highway in 1915 which improved the Oregon-California Stage line road from Portland to Sacramento. By 1924, the Pacific Highway was paved through Douglas County, allowing all weather travel. The 1950s saw the construction of the Interstate Five freeway through Douglas County allowing for faster north and south access and an increase in travel. During this period the BLM and private timber companies began to extend the miles of roads into their timber holdings. The new improvements to the transportation system allowed for faster transportation of

commodities and year around harvest of timber. Receipts from the O&C lands contributed immensely to the improvement of roads throughout Douglas County (Beckham 1986).

d. Timber/Logging

Cadastral survey notes from the mid-nineteenth century mention the vegetation consisted of grasslands in the valleys, oak openings on the mid-slopes, and timber on the upper slopes of the WAU. The vegetation mosaic described appears to be similar to what occurred in the area in 1936 (see Map 4).

The earliest sawmill, operated by David Ransome, opened around 1853 (Reinhart 1962). In 1873, Pickett and Wilson opened two saw mills on Canyon Creek, one produced 300,000 board feet and the other produced 200,000 board feet of lumber annually (Walling 1884). In 1905, Duncan and Ross established a mill in Canyonville producing 283,000 board feet of lumber annually (Clough 1958). After World War II, timber production became the major influence on the landscape in the Canyonville/Canyon Creek WAU. The increased demand for lumber to build houses and the transportation system improvements generated a marked increase in timber harvesting in the WAU.

2. Current Conditions

The dominant human uses in the Canyonville/Canyon Creek Watershed Analysis Unit have been timber production, transportation, agriculture, recreation, and service-related activities. The most recent economic development within the WAU is the Seven Feathers Casino and Resort. There are no treaty rights or tribal uses on BLM administered lands in the WAU, although individual tribal members may utilize the area.

a. Timber

Timber harvesting has had a major influence on the WAU. Spurred by the demand for lumber after World War II, timber became the major influence within the WAU. Both private and Federally-managed land contributed to the harvest of timber and lumber production over the last 45 years.

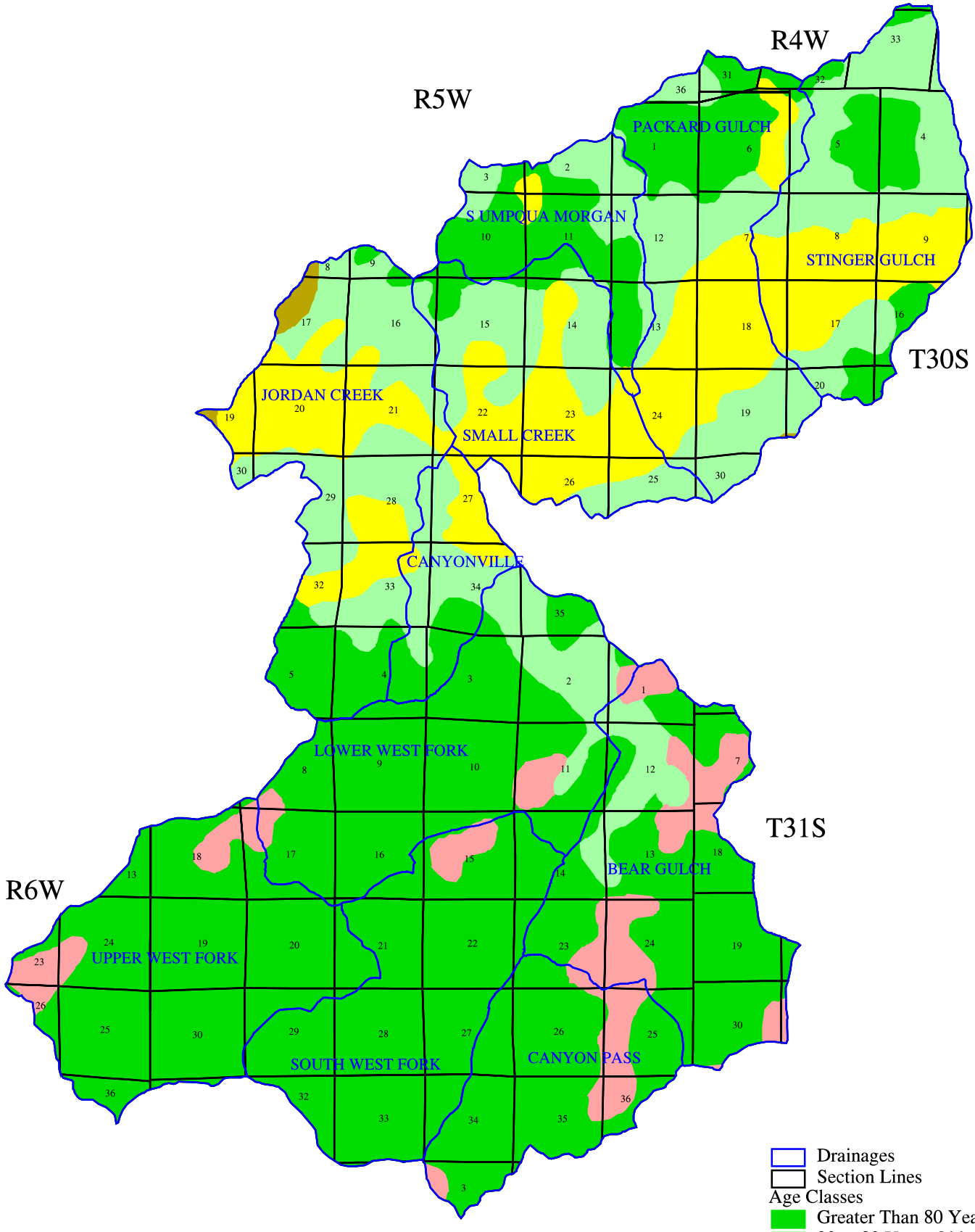
b. Agriculture

There are approximately 7,885 acres (18%) of agricultural/pasture lands within the WAU. A variety of grain and fruit crops were important agricultural products in the past. The production of livestock, both sheep and cattle, are the primary agricultural commodities now.

c. Mining and Minerals

Miners were drawn to the WAU following the discovery of gold in Josephine and Jackson Counties. Locatable mineral resources within the WAU with mining potential include massive sulfides with copper and zinc, gold lode and placer deposits, and talc. Copper was discovered in the Packard Gulch Drainage

Map 4. Canyonville/Canyon Creek Watershed Analysis Unit
1936 Age Class Distribution



and in the southern parts of the Canyonville and Jordan Creek Drainages. Copper was produced as a by-product from the Golden Gate gold mine located on the western edge of the Upper West Fork Drainage. The Levans Ledge gold mine was located in the southern part of the Jordan Creek Drainage. The Levans Ledge mine is patented and has seven adits. Placer gold is known to occur in the South Umpqua River and all of the main creeks in the WAU. Talc has been identified in the Lilya and Moyer prospects along the boundary of the Jordan Creek and Canyonville Drainages. Silver prospects occur in the Lower West Fork Drainage. Mercury prospects occur in the northern part of the Bear Gulch Drainage.

The known abandoned mines within the WAU include one site with potential water quality problems and safety concerns, two sites with potential safety concerns only, and the Mighty-Fine-Mine. The Mighty-Fine-Mine site was previously reclaimed by the BLM.

Salable minerals include sand, gravel, and quarry rock. Sand and gravel have been mined from the South Umpqua River. Community Rock Pits are located in the Lower West Fork, South West Fork, and Bear Gulch Drainages.

The Turkey Creek Community Pit is located in the SW 1/4 of the SE 1/4 of Section 13 in T31S, R5W. This pit has the potential to be developed into a "Regional Pit" and the material meets BLM specifications. Reserves are estimated to be approximately 100,000 cubic yards. It is close to Interstate 5 and the relatively rock poor West Fork of Canyon Creek area to the west. With some road improvements, the rock from the Turkey Creek pit could be used to supply surfacing needs in the Packard Gulch, O'Shea Creek, and Russel Creek areas. Major development would be required to continue removing rock from this source, including timber and overburden removal. The quarry is located within an LSR. A check of GIS themes indicates that Special Status Species and Riparian Reserves would not be affected by operations. A power line Right-of-way and transmission lines pass by the quarry. The location of the transmission lines and being located within an LSR could present problems with future development.

The Indian Crest Community Pit is located in the NE 1/4 of the NE 1/4 of Section 29 in T31S, R4W. The quality of rock is poor to fair. Some development would be required to remove the roughly estimated 10,000 cubic yards of reserves. The area serviced from Indian Crest Community pit could be supplied from the Turkey Creek pit if some roads were improved.

There are three Community Pits in the West Fork of Canyon Creek area. They are the Double Eagle, and Magic Mt #1 & #2 pits. While the quality of material is good, none of these pits contain much more than 10,000 cubic yards of material. Magic Mt #1 is a good candidate for closure and reclamation.

d. Recreation

Recreation use in the Canyonville/Canyon Creek Watershed Analysis Unit is determined by the land ownership, topography, forest types and ages in the area. Special Use Permits are not required for recreation use in the WAU. Recreation is basically limited to dispersed forms. No improved sites currently

exist on BLM administered lands within the WAU. However, the WAU contains areas with recreation oriented designations, such as the Myrtle Creek to Canyonville Scenic Historic Tour Route, Bear Gulch Area of Critical Environment Concern/ Research Natural Area (ACEC/RNA), a corridor of Visual Resource Management (VRM) Class II, and an active Off-Highway Vehicle (OHV) use area west of I-5. Trails, day use, and interpretive opportunities would require development of the sites or permits.

The Recreation Opportunity Spectrum (ROS) designates the vast majority of the Federally managed lands in the Canyonville/Canyon Creek WAU as Roaded Natural. The area around the town of Canyonville has a strong Rural setting. However, the BLM has limited holdings in this area. The areas with Federally managed lands are characterized by predominantly natural appearing environments with moderate evidence of the sights and sounds of man. Resource modification and utilization practices are evident, but usually harmonize with the natural environment. Interaction between users may be low to moderate, but with evidence of other users prevalent. Rustic facilities are provided for user convenience as well as for safety and resource protection. Facilities are designed and constructed to provide for conventional motorized use.

1) Off Highway Vehicles (OHV)

The predominant OHV designation in the RMP for the Canyonville/Canyon Creek WAU is 'Limited' to existing roads and trails. Under this designation, existing roads and trails are open to motorized access unless otherwise identified (i.e. hiking trails). Licensed vehicles may use maintained roads and natural surface roads and trails. Registered OHVs such as All Terrain Vehicles (ATVs) and motorcycles not licensed for the public roads may only use existing roads and trails that are not maintained (graveled).

An area west of I-5 and south Canyonville has had locally extensive OHV use, but does not have an RMP planning designation for this type of use. Areas 'Closed' to OHV travel to protection the sites due to the scientific, research, and educational values include the Bear Gulch Research Natural Area consisting of 330 acres and one progeny test site for Douglas Fir consisting of eleven acres.

New roads and trails may be approved and constructed in limited areas, through the NEPA process. State funds from gas taxes and registrations may be available to BLM to develop any OHV areas. If problems occur within road and trail systems, they may be closed on an emergency basis through 43 CFR 8341 and 8364.

2) Visual Resource Management (VRM)

The Canyonville/Canyon Creek WAU contains VRM Class II and Class IV lands. Under the Class II designation, low levels of change to the characteristics of the landscape are allowed. A Class IV designation allows for major modifications. Class II lands occur along the I-5 corridor and one small area along County Road 1. The remainder of the WAU is designated as Class IV.

Management within the Class II lands stresses a light touch by using timber harvesting methods such as single tree selection, uneven aged harvest, retention of shelterwood overstory trees, or group selection. Regeneration harvests are not to exceed 6.6% of the land base per decade in visible areas of the Class II land.

Under the Class IV designation, the extent of change to the character of the landscape can be high. Management activities may dominate the view and may be the major focus of the viewer's attention. However, every attempt should be made to minimize the impact of these activities through careful unit location, minimal disturbance, and repetition of the basic elements of form, line, and texture.

3) Recreation Management

The WAU falls within the South River Extensive Recreation Management Area (ERMA). Within the ERMA recreation is mainly unstructured and dispersed, where limited needs or responsibilities require minimal recreation investments. The ERMA, which constitutes the bulk of the public land, gives recreation visitors the freedom of choice with minimal regulatory constraints.

Forms of recreation commonly observed in the Canyonville/Canyon Creek WAU include driving for pleasure, hunting, photography, picnicking, camping, shooting or target practice, and gathering (berries, flowers, mushrooms, greens, and rocks). The areas along major roads and the larger streams and South Umpqua River are common sites for these various forms of recreation. Some of the most popular sites used for these forms of recreation are the forest road system throughout the WAU, the Myrtle Creek to Canyonville Scenic Historic Tour Route on County Road 1, and the Bear Gulch ACEC/RNA in T31S, R4W, Section 7 and T31S, R5W, Sections 1 and 12.

The Canyonville/Canyon Creek WAU has limited recreation potential, but has the largest VRM Class II block of land in the South River Resource Area. The BLM administered lands along I-5 probably receive the greatest visual scrutiny by non-local people of any area in the District. Generally, strong conflicts between Recreation and other resource uses in the WAU have been resolved by the Land Use Allocations.

B. Vegetation

1. Historical Perspective and Reference Vegetation Conditions

The Canyonville/Canyon Creek WAU is located in the Klamath Mountain Physiographic Province (Franklin and Dyrness 1984). Climax vegetation consists of the Douglas-fir and evergreen temperate forest types (Franklin and Dyrness 1984).

A map in the Roseburg District BLM Geographic Information System (GIS) gives general forest type descriptions of vegetation in 1936 for Douglas County in terms of diameter class and species (see Map 4 and Table 2). Although the map scale is large and lacks detail, the type map may be used to compare vegetation conditions in 1936 with current vegetation conditions.

In 1936, all structural classes ranging from early to late seral were represented but in large uniform blocks. The Canyonville/Canyon Creek WAU landscape was comprised of 17% in agricultural land and hardwoods, 5% in early seral, 24% in mid seral, and 54% in late seral.

a. Fire History and Natural Fire Regimes

Fire has been an important disturbance factor in Pacific Northwest forests for thousands of years. The "unmanaged" or "natural" forests, those that developed before widespread logging or fire protection existed, were initiated by fire and most have been altered by fire since establishment. Early accounts suggest that fires were highly variable, occurring frequently or infrequently, and killing all the trees at times or sometimes leaving the mature trees unscathed (Agee 1990).

Fire regimes of the Pacific Northwest have been described by Agee (1981). Fire regimes are broad, artificially grouped categories, which overlap considerably with one another. Forests are considered to have a similar fire regime when fires occur with similar frequency, severity, and extent. Effects of forest fires can be more precisely described if areas can be grouped by fire regimes. The Canyonville/Canyon Creek WAU is considered to have a high-severity fire regime, where fires are very infrequent (more than 100 years between fires) and are usually high-intensity, stand replacing fires. High-severity fire regimes typically occur in cool, moist forest types. In high-severity fire regimes, fires occur under unusual conditions such as during drought years, during east wind weather events (hot and dry foehn winds), and with an ignition source such as lightning. Fires are often of short duration (days to weeks) but of high intensity and severity (Pickford et al. 1980). Most of the Roseburg BLM District administered lands are classified as being in the high-severity fire regime, which is common to the coastal mountains of Oregon, the middle to northern Cascades, the Olympic Mountains, and other typical westside forests.

Other fire regimes exist within the Canyonville/Canyon Creek WAU. Lower elevations along the South Umpqua River and west of Canyonville toward Riddle have more open, grass covered forest types that transition to Western hemlock/Douglas-fir forests. The transition occurs with changes in aspect and elevation.

Table 2. 1936 Age Class Distribution in the Canyonville/Canyon Creek WAU.

	Nonforest		Early Seral (0 to 30 Years Old)		Mid Seral (31 to 80 Years Old)		Late Seral (80 + Years Old)		Hardwoods		
Area	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Total Acres
Bear Gulch	0	0	1,025	22	643	13	3,095	65	0	0	4,763
Canyon Pass	0	0	465	16	0	0	2,526	84	0	0	2,991
Canyonville	351	25	0	0	669	47	389	28	0	0	1,409
Jordan Creek	1,912	37	0	0	2,311	45	838	16	128	2	5,189
Lower West Fork	0	0	266	5	892	17	4,151	78	0	0	5,309
South West Fork	0	0	176	4	0	0	4,340	96	0	0	4,516
Upper West Fork	0	0	417	8	0	0	4,695	92	0	0	5,112
Canyon Creek Subwatershed	2,263	8	2,349	8	4,515	15	20,034	68	128	0	29,289
Packard Gulch	1,665	36	0	0	1,840	40	1,143	25	4	0	4,652
South Umpqua Morgan	122	6	0	0	681	34	1,224	60	0	0	2,027
Small Creek	1,748	49	0	0	1,485	42	311	9	0	0	3,544
Stinger Gulch	1,514	34	0	0	2,057	46	923	21	0	0	4,494
Canyonville Portion of Shively-O'Shea Subwatershed	5,049	34	0	0	6,063	41	3,601	24	4	0	14,717
Canyonville/Canyon Creek Watershed Analysis Unit	7,312	17	2,349	5	10,578	24	23,635	54	132	0	44,006

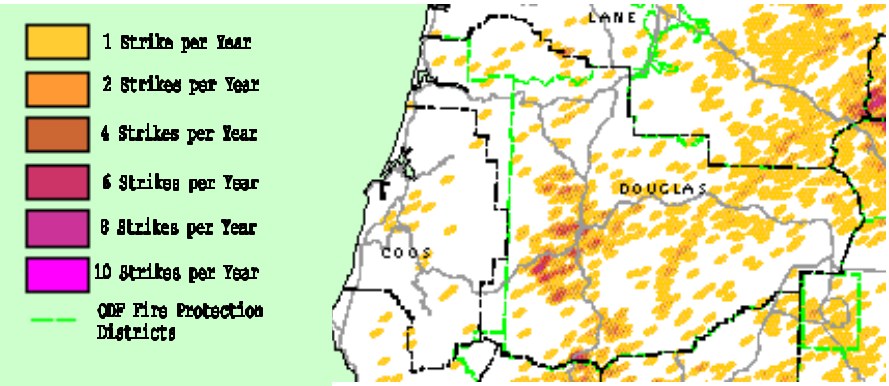
Accurate fire return intervals have not been calculated in Pacific Northwest forests, because the intervals between fires are long and may not be cyclic (Agee and Flewelling 1983). On drier sites, forests may burn every 100 to 200 years. Fahnestock and Agee (1983) estimated the regional average to be 230 years. Douglas-fir begins to be replaced by the more shade tolerant western hemlock at approximately 250 years of age and continues until the stand is about 700 to 1,000 years old, when western hemlock dominates the stand. The cycle from Douglas-fir to western hemlock is rarely completed because fires, which create stand openings allowing Douglas-fir to regenerate, usually occur before Douglas-fir disappears from the stand (Agee 1981).

b. Recent Fire History

Fire suppression during the past 75 years has been successful at minimizing the number of forested acres lost to wildfire. During this same period prescribed fire has been used extensively. The pattern of prescribed fire use has evolved in the last 50 years. Originally, prescribed fire was used almost exclusively for reducing fire hazard. More recently the emphasis has shifted to using prescribed fire for site preparation prior to reforestation (Norris 1990).

Lightning is the primary natural source of forest fires in the world. Although the Pacific Northwest has relatively mild thunderstorm activity compared to the southeastern United States, the average annual number of lightning caused fires is greater in the West because less precipitation accompanies the thunderstorms (Agee 1993). Considerable variation in thunderstorm tracking patterns exists from year to year and from storm to storm, some being widespread and others consisting of localized events (Morris 1934). The lightning strike frequency map (Map 5) shows less than one lightning strike per year occurred over most of the Roseburg District during the four year period from 1992 to 1996. This map graphically displays the widespread and random distribution of lightning across Douglas County but gives no indication which lightning strikes may have ignited wildfires.

Map 5. Number of Lightning Strikes in Douglas County from 1992 to 1996.



Nineteen eighty-seven was the most severe fire year in the last 50 years, and one of the two worst in the last 120 years, yet the acreage burned was only 30 percent of the average acreage historically burned by wildfire in Oregon. Modern fire suppression and fire management strategies have had a profound effect on natural fire frequency and intensity, species composition, vegetative density, and forest structure in many forests in the Pacific Northwest (Norris 1990).

From 1980 to 1994 there were 23 fires within the Canyonville/Canyon Creek WAU that burned approximately 5,927 acres. Most of the fires were lightning caused. Sixteen fires were caused by lightning, burning approximately 5,705 acres. The Canyon Mountain Fire, which was started by lightning, burned approximately 5,700 acres in 1987. The seven human caused fires burned approximately 222 acres.

The combined effects of fire suppression, timber harvesting followed by prescribed burning, and occasional wildfires have shaped current forest conditions in the Canyonville/Canyon Creek WAU. Discussing these forests in terms of the natural fire regime helps explain why species composition and forest density has changed with human management, dating back thousands of years when native Indians set fires as a means of improving areas for foraging. In many forests of the West, years of successful fire suppression have created unnatural fuel accumulations causing fires to be more destructive, burning with greater intensity and in fire regimes where stand replacement fires would rarely occur in a "natural" forest. Forest health has declined in many areas because fire has been excluded. Fire suppression has probably had little or no effect on fuel accumulation on the westside (with the exception of southwest Oregon) where the natural fire regime has a long return interval (Norris 1990).

2. Current Vegetation Conditions

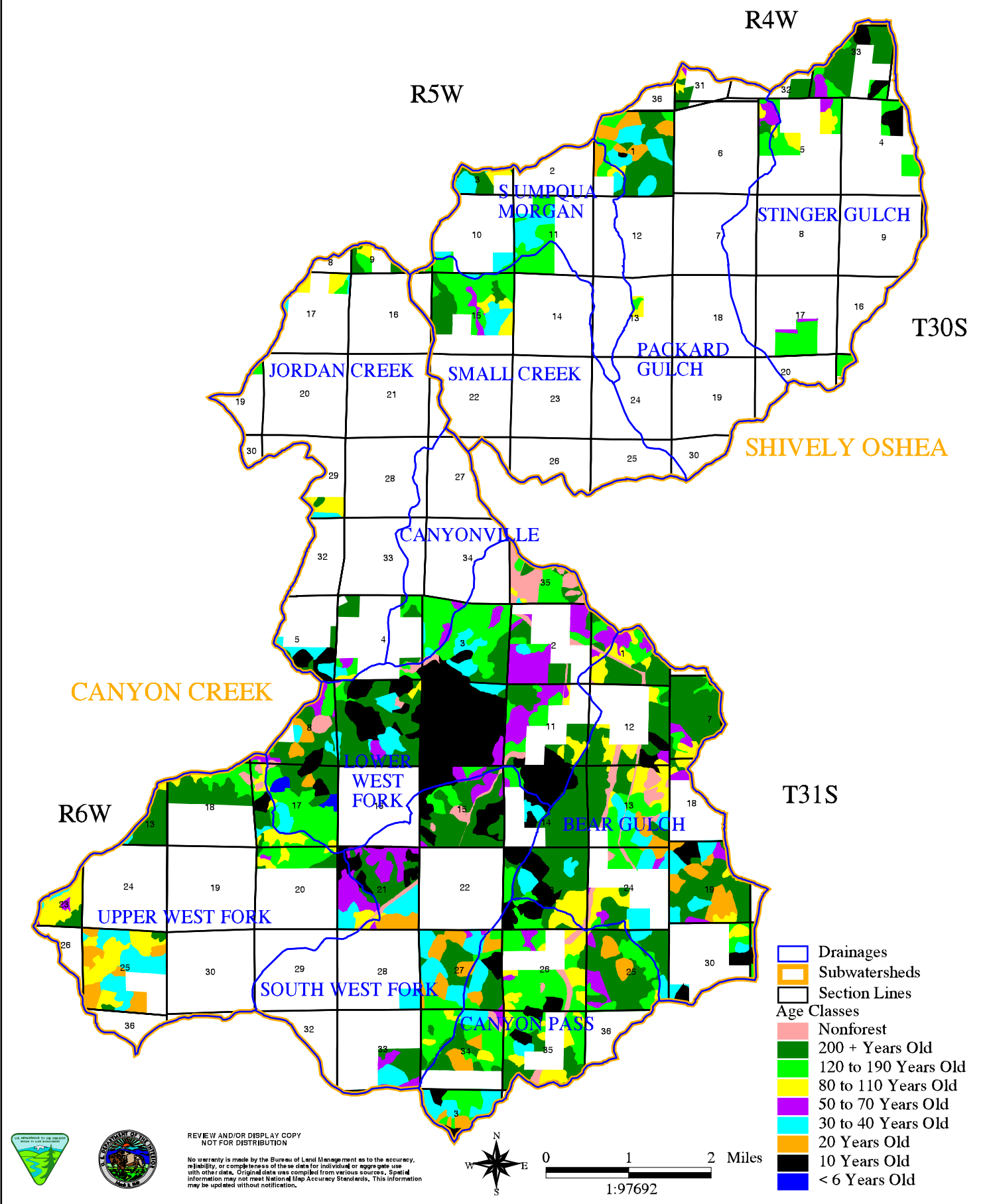
Various vegetation age classes have been documented in the Canyonville/Canyon Creek WAU. For this analysis, vegetation on BLM administered lands is described by the age of the dominant conifer cover for each stand. The stands are aggregated into selected age class groupings for comparison with the 1936 vegetation data (see Table 3 and Map 6). Private lands are aggregated by the same age class groupings. Acres of nonforested lands, including agricultural lands, are also identified. The arrangement of these age classes on the landscape within the WAU is a result of historic and recent natural (e.g., fire and blowdown), and human caused disturbance (e.g., introduced fire for clearing, tree harvesting, road construction, home building, and division of land by straight line boundaries).

The 1936 diameter classes may be correlated to age classes used for the current vegetation conditions. The 0 to 6 inch diameter classes are correlated with stands between 0 and 30 years old. These classes are labeled Early Seral. Diameter classes 6 to 20 inches are correlated to stands between 30 and 80 years old. These classes are labeled Mid Seral. Diameter classes greater than 20 inches are correlated to stands greater than 80 years old. These classes are labeled Late Seral. Agricultural land was also identified in the 1936 vegetation type map. The agricultural land may be correlated with the nonforest lands used in the current vegetation type descriptions.

Table 3. 1997 Age Class Distribution in the Canyonville/Canyon Creek WAU.

	Nonforest		Early Seral (0 to 30 Years Old)		Mid Seral (31 to 80 Years Old)		Late Seral (80 + Years Old)		
Area	Acres	%	Acres	%	Acres	%	Acres	%	Total Acres
Bear Gulch	294	6	644	14	1,425	30	2,400	50	4,763
Canyon Pass	116	4	486	16	754	25	1,635	55	2,991
Canyonville	587	42	69	5	513	36	240	17	1,409
Jordan Creek	1,880	36	255	5	2,694	52	360	7	5,189
Lower West Fork	507	10	1,610	30	1,326	25	1,865	35	5,308
South West Fork	97	2	705	16	2,839	63	875	19	4,516
Upper West Fork	75	1	296	6	3,715	73	1,025	20	5,111
Canyon Creek Subwatershed	3,556	12	4,065	14	13,266	45	8,400	29	29,287
Packard Gulch	1,639	35	570	12	1,971	42	471	10	4,651
South Umpqua Morgan	527	26	192	9	1,016	50	291	14	2,026
Small Creek	2,194	62	6	0	873	25	470	13	3,543
Stinger Gulch	2,212	49	214	5	1,476	33	591	13	4,493
Canyonville Portion of Shively-O'Shea Subwatershed	6,572	45	982	7	5,336	36	1,823	12	14,713
Canyonville/Canyon Creek Watershed Analysis Unit	10,128	23	5,047	11	18,602	42	10,223	23	44,000

Map 6. Canyonville/Canyon Creek Watershed Analysis Unit
BLM Age Class Distribution



Hardwood stands classified in the 1936 vegetation type map is not correlated with any specific vegetation type or age class in the 1997 vegetation classification.

In 1997, the Canyonville/Canyon Creek Watershed Analysis Unit seral stages were comprised of 23% in agricultural land and hardwoods, 11% early seral, 42% in mid seral and 23% in late seral (see Table 4 and Map 7). The current age classes occur in smaller blocks than what was present in 1936. Generally, the late seral stands have been converted to early seral stands.

The main causes for the difference between conditions are land ownership, agricultural activities, forest management activities and natural disturbances. Land ownership and timber harvesting have been the major activities fragmenting the WAU in the last 50 years. Before intensive timber harvesting began, stand replacing fires were the major disturbance concentrating the early seral stage in a more contiguous manner. Timber harvesting has shaped the vegetative structure and pattern from the late 1940s up to the present day.

A large part of the Canyon Creek Subwatershed burned in the late summer of 1987. A dry lightning storm started fires, which burned approximately 5,700 acres in this subwatershed. Besides burning up many young plantations and mature stands, the fire underburned old, residual fire stands destroying the reproduction and the young tree understory leaving the residual, defective old-growth trees. Considerable effort has gone into reforesting this area because of the harsh conditions such as shallow rocky soils, high summer temperatures, and vegetative competition. The salvage areas and the young plantations have been replanted and efforts to maintain the stocking is continuing. Reforestation is difficult on south and west facing slopes. Paper mulching and shading of seedlings are required on regeneration harvest units.

a. Vegetative Characterization

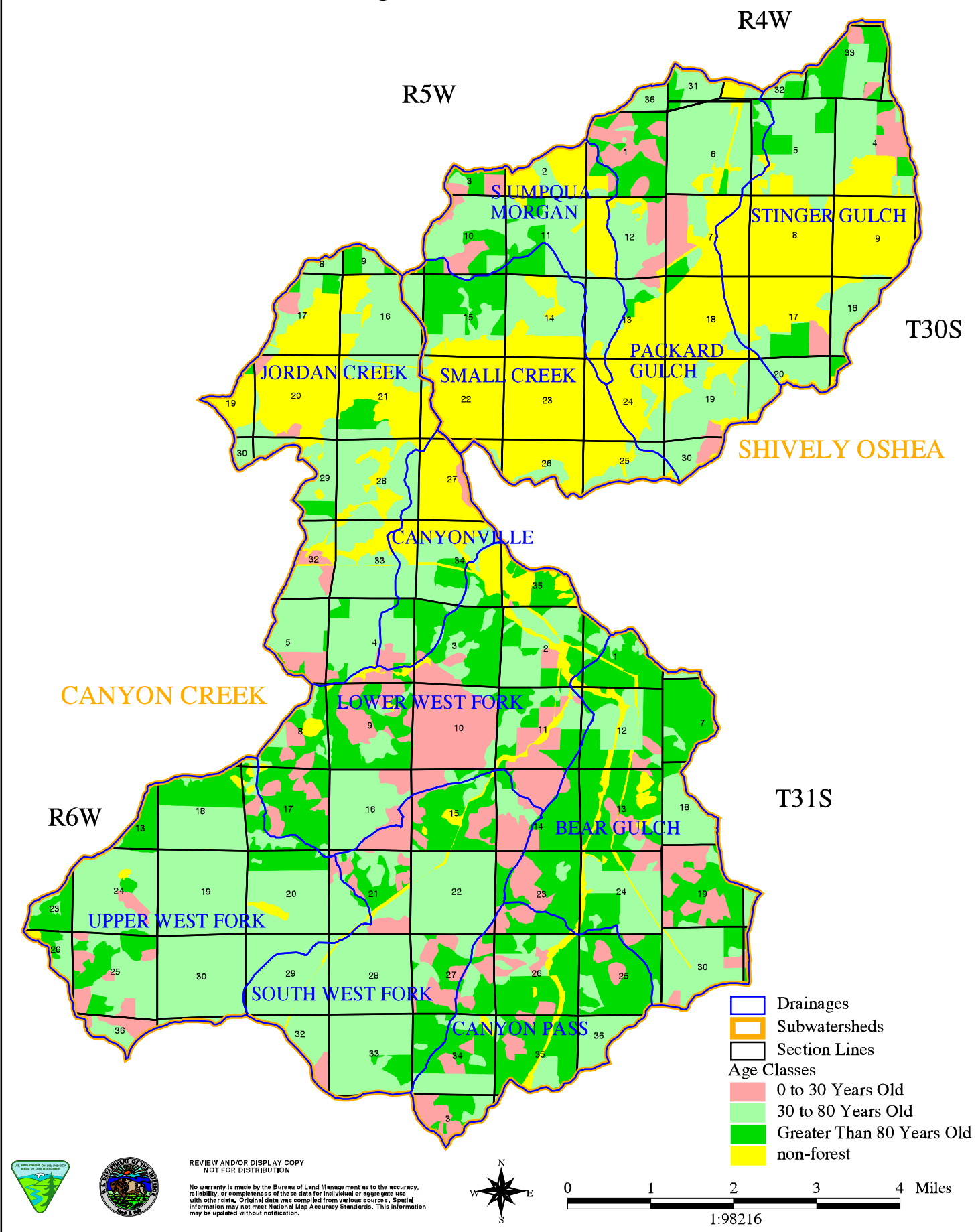
Vegetation zones in the Canyonville/Canyon Creek Watershed Analysis Unit were characterized from the Natural Resources Conservation Service Soil Survey report (Gene Hickman 1994). Vegetation zones may cover large geographical areas, but always have a single set of potential native plant communities repeated throughout the zone. The patterns are predictable since they are related to local landscape features such as aspect, soil, and landform. Microclimate should be relatively similar throughout a given zone. Vegetation zones give an approximate guide to complex local vegetation patterns. Natural plant succession and stand development processes differ between vegetative zones within the WAU. A wide variety of soils and related geologic features directly affect local plant distribution and the resulting plant communities.

Five vegetative zones are identified within the Canyonville/Canyon Creek Watershed Analysis Unit (see Map 8). Three zones, the Interior Valleys and Foothills Zone, the Douglas-fir/Chinkapin Zone, and the Grand Fir Zone, make up 93% of the WAU. Two other zones, the Western Hemlock Zone and the Cool Douglas-fir/Hemlock Zone make up the remaining 7% of the WAU at the higher elevations.

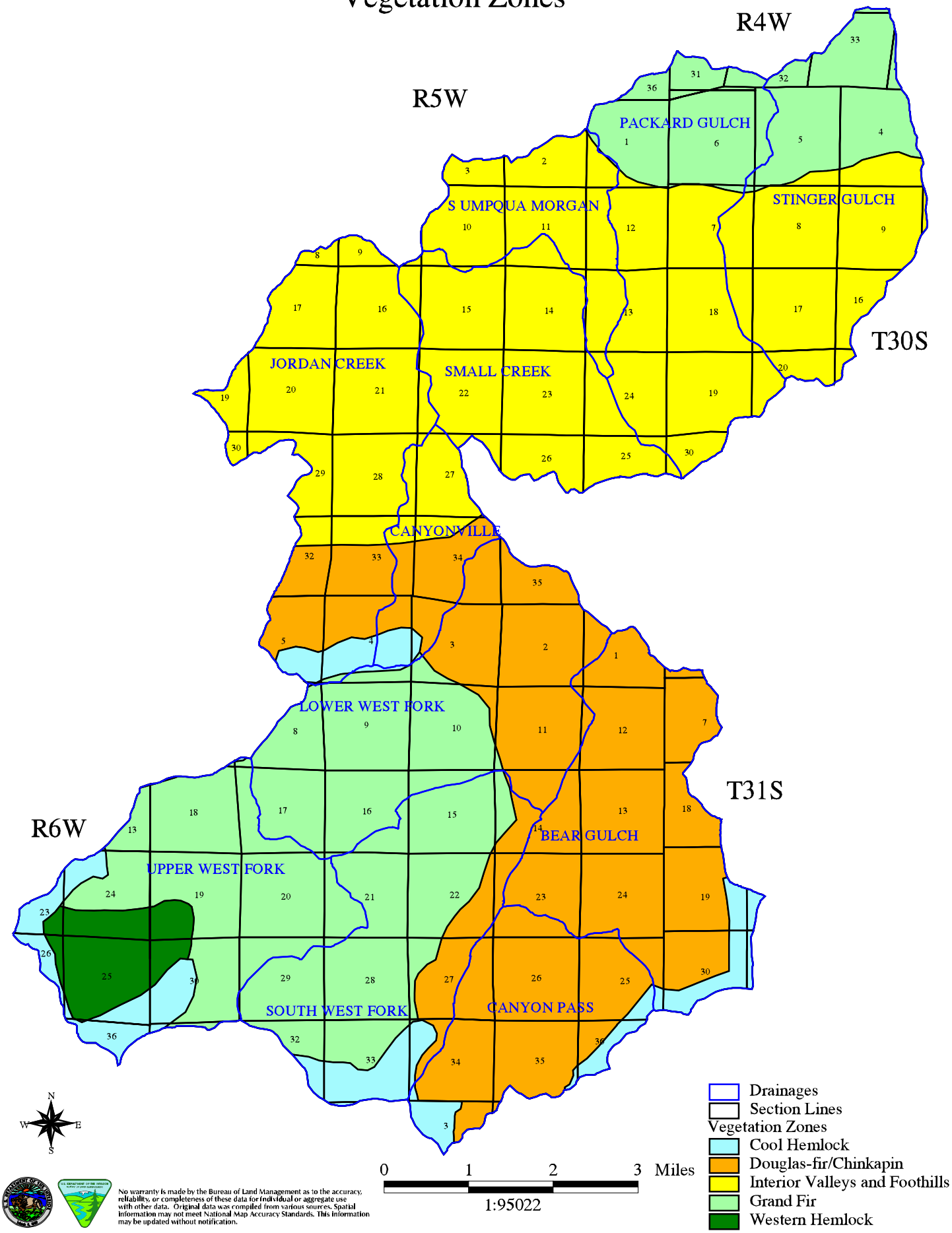
Table 4. 1997 BLM Age Class Distribution.

	Number of Acres by Age Class and Percent of Total																		
AREA	Nonforest	%	< 5	%	10	%	20	%	30 to 40	%	50 to 70	%	80 to 110	%	120 to 190	%	200 +	%	TOTAL
Bear Gulch	161	5	0	0	235	7	181	5	348	10	121	4	427	13	316	9	1,571	47	3,360
Canyon Pass	78	3	0	0	177	8	153	7	222	10	89	4	240	10	799	34	558	24	2,316
Canyonville	3	1	0	0	0	0	0	0	9	4	18	9	0	0	151	75	20	10	201
Jordan Creek	3	1	0	0	24	6	39	9	83	20	13	3	113	27	49	12	100	24	424
Lower West Fork	255	6	0	0	1,243	31	45	1	223	6	455	11	76	2	760	19	960	24	4,017
South West Fork	67	4	0	0	252	13	166	9	324	17	185	10	20	1	254	13	621	33	1,889
Upper West Fork	31	2	0	0	45	3	135	8	250	15	107	7	440	27	247	15	381	23	1,636
Canyon Creek Subwatershed	598	4	0	0	1,976	14	719	5	1,459	11	988	7	1,316	10	2,576	19	4,211	30	13,843
Packard Gulch	0	0	0	0	0	0	111	17	121	18	36	5	35	5	92	14	268	40	663
South Umpqua Morgan	0	0	0	0	2	1	26	7	177	44	0	0	24	6	113	28	58	14	400
Small Creek	2	0	0	0	0	0	0	0	52	10	20	4	43	8	313	57	115	21	545
Stinger Gulch	0	0	0	0	86	12	0	0	2	0	45	6	45	6	323	45	222	31	723
Portion of WAU in the Shively-O'Shea Subwatershed	2	0	0	0	88	4	137	6	352	15	101	4	147	6	841	36	663	28	2,331
Canyonville/Canyon Creek Watershed Analysis Unit	600	4	0	0	2,064	13	856	5	1,811	11	1,089	7	1,463	9	3,417	21	4,874	30	16,174

Map 7. Canyonville/Canyon Creek Watershed Analysis Unit
1997 Age Class Distribution



Map 8. Canyonville/Canyon Creek WAU
Vegetation Zones



1) Interior Valleys and Foothill Zone

The Interior Valleys and Foothills Zone comprises about 36% of the Canyonville/Canyon Creek WAU. Much of the zone is composed of hills and low mountains extending into the interior from both the Cascade and Coast Range Mountains. Climatic conditions include hot summers and mild winters with an average annual precipitation between 30 and 50 inches.

Uplands with the most favorable soils have coniferous forests of Douglas-fir with subordinate species such as madrone, bigleaf maple, or oak. More droughty soils in the uplands support hardwood dominated stands of madrone, Oregon white oak, sometimes California black oak, with minor amounts of conifers. Some shallow slopes support only scattered Oregon white oak and grass or shrubs such as wedgeleaf ceanothus and poison oak.

This zone is separated ecologically from the adjacent vegetative zones by its dry, warm climate, the high proportion of hardwoods in the uplands, and the absence of indicator species from the Grand Fir Zone. Much of the natural vegetation of this zone has been affected by settlement or grazing, and large areas have been converted to cropland including improved pasture.

2) Grand Fir Zone

The Grand Fir Zone forms a transition between moist hemlock forests and the drier interior valleys. This zone makes up about 29% of the Canyonville/Canyon Creek WAU. This area of mountains and foothills receives from 40 to 55 inches average annual precipitation. Elevation remains below about 3,200 feet.

Douglas-fir dominates the older stands with grand fir common on the northern slopes and minor or absent on the south slopes. Golden chinkapin occurs regularly on north aspects. Pacific madrone and occasionally California black oak are common on south aspects. Incense-cedar is often present. The area is generally too dry for western hemlock except in some drainages or very moist north slopes.

Understory shrubs on north slopes include salal, cascade Oregon grape, western hazel, creambush oceanspray, red huckleberry, western prince's pine, whipplevine, yerba buena, and hairy honeysuckle. South slopes support any of the above, although red huckleberry, cascade Oregon grape, and salal, which require more moisture, have minor species occurrence. Grasses and poison oak become more abundant on the south aspects. Where the drier edge of the zone approaches the Interior Valleys and Foothills Zone salal, red huckleberry, and even grand fir may drop out. Some key indicator species for the zone remain present such as Oregon grape, golden chinkapin, wild ginger, and insideout flower.

The Grand Fir Zone in this WAU resembles the vegetation in Josephine and Jackson counties. The zone overlaps the Klamath Mountain geologic province as well. Geological differences and climatic changes result in more species diversity and an increasing importance of California black oak, sugar pine, ponderosa pine, canyon live oak, incense-cedar, and grasses.

3) Douglas-fir/Chinkapin Zone

The Douglas-fir/Chinkapin Zone makes up about 27% of the Canyonville/Canyon Creek WAU. This zone extends south into northeast Josephine County and northwestern Jackson county. Average annual precipitation ranges between 35 and 60 inches. The elevational range is up to 3,200 feet. Soils in this zone have mesic temperature regimes and xeric moisture regimes.

Douglas-fir is the dominant species on upland slopes except for shallow soils and soils with high amounts of rock fragments where Oregon white oak, canyon live oak or drought tolerant shrubs occur. On south aspects, Douglas-fir is joined by Pacific madrone, California black oak, canyon live oak, sugar pine, ponderosa pine, and incense-cedar. Grand fir is generally absent in the uplands but frequently occurs on the bottom lands throughout the zone.

4) Cool Douglas-fir/Hemlock Zone

This zone makes up about 5% of the land in the Canyonville/Canyon Creek WAU. This zone occupies high elevations, generally above 3,000 feet. Average annual precipitation ranges from 50 to 120 inches, some coming in the form of snow.

Douglas-fir is the dominant species. Depending on the soil, western hemlock may also occur. Some areas also include sporadic occurrences of western red cedar, incense-cedar, sugar pine, Pacific yew, and white fir. Canyon live oak is found on soils with high amounts of rock fragments. Rhododendron, Oregon grape, salal, chinkapin, and red huckleberry occur in the understory.

Forest managers can expect lower tree growth rates, climatic limitations for regeneration and severe competition from evergreen shrubs in the zone. Areas burned or with the overstory removed develop dense brush fields.

5) Western Hemlock Zone

This zone occupies a about 2% of the land in the Canyonville/Canyon Creek WAU. It occurs only in the Silver Butte area. Douglas-fir is the dominant species. Western hemlock is a significant understory species or may be dominant in older stands on north aspects. It may be present in minor amounts on south aspects. Grand fir, western red cedar, and chinkapin can also occur in the stands. Red alder and bigleaf maple occur in favorable locations. Understory species include western sword fern, oxalis, vine maple, current, western hazel, creambush oceanspray, Pacific rhododendron, salal, red huckleberry, cascade Oregon grape, and some evergreen huckleberry.

b. Insects and Pathogens

Insects and pathogens are capable of causing both large and small-scale disturbances across the landscape. White pine blister rust is an introduced disease that occurs in the Canyonville/Canyon Creek WAU. This

disease infects white pine and sugar pine. All other diseases known to occur in the WAU are native to the region and have evolved with their hosts. Native insects and diseases may cause mortality of a single tree or small patches of trees (less than one acre in size). Insects or pathogens may be operating across the entire WAU or restricted to local areas by favorable environmental conditions. The magnitude of insect and disease related disturbances is greatly influenced by species composition, age class, stand structure, and the history of other disturbances on the same site.

1) Port-Orford Cedar Root Disease

Port-Orford cedar root disease is another non-native disease which may occur in the Canyonville/Canyon Creek Watershed Analysis Unit. However, extensive road surveys in 1996 did not locate any Port-Orford cedar within the WAU. Since the surveys were limited to the areas adjacent to roads, it is possible Port-Orford cedar may occur in the WAU but was undetected. The area south and west of Interstate 5, in Townships 30 and 31, and Ranges 5 and 6, is considered to be within the range of Port-Orford cedar and most likely where Port-Orford cedar would occur.

2) White Pine Blister Rust

White pine blister rust is caused by the fungus Cronartium ribicola and is evident in the Canyonville/Canyon Creek WAU. It infects all five-needle pines, including western white pine and sugar pine. The pathogen girdles and kills infected stems and branches causing top and branch death in larger hosts and outright mortality in seedling, sapling, and pole-sized hosts. Infections in larger trees can predispose these trees to bark beetle attack. Ribes (gooseberry and current) plants are alternate hosts for the fungus and under the right environmental conditions release spores that infect the pines. Moist cool weather in summer and fall favor the disease, whereas warm dry weather is unfavorable. Infection of pine requires at least 2 days of saturated atmosphere and maximum temperatures not exceeding 68 degrees Fahrenheit (EF) (Scharpf 1993).

Tree improvement programs have developed resistant western white pine and sugar pine trees that can tolerate infection by the fungus. Rust resistant stock should be used with all reforestation efforts for those two species. Sugar pine is desirable because it is highly resistant to laminated root rot and is a preferred species for planting in root disease centers.

3) Root Diseases

Laminated root rot (Phellinus weirii), annosus root disease (Heterobasidion annosum), armillaria root disease (Armillaria astoyae), and black stain root disease (Leptographium wagereri) are common root diseases that may be present in the WAU. Root diseases affect stand structure, species composition, tree density, and crown closure, They injure trees by decaying and killing roots or by preventing proper root function. Damage is expressed as reduced rates, butt decay, windthrow, death, and predisposition to bark beetle attack. Expansion rates average about one to two feet per year for laminated, annosus, and armillaria root pathogens (Filip and Schmitt 1990). Black stain root disease spreads more rapidly, the

disease center may double every three years. Root diseases can cause scattered mortality of individual trees or large openings devoid of susceptible mature trees. The size of the openings are dependent upon the root disease susceptibility of the vegetation on the margins and the vegetation that seeds in after the openings are created.

Root pathogens are extremely difficult to eradicate from the site once they become established. However, the damage they cause can be minimized. Depending on the disease present, this may be accomplished by increasing host vigor, favoring disease-tolerant conifer species, or reducing inoculum (Filip and Schmitt 1990).

4) Bark Beetles

There is a common association between root diseases and bark beetles. A high proportion of Phellinus weirii infected trees are actually killed by bark beetles and not by the root rot fungus (Thies and Sturrock 1995). Phellinus weirii plays a significant role in maintaining endemic bark beetle populations over time. Phellinus weirii and other root diseases provide a continuous source of favorable host material for beetles between those times when conditions are favorable for epidemics (Thies and Sturrock 1995). Bark beetles rarely kill healthy, vigorous trees except when epidemic levels are reached. Bark beetle populations are most likely to build up when at least four trees per acre, which are at least ten inches in diameter at breast height (DBH), are downed (Goheen 1996). Following wind and snow storms during the winter of 1996, the conditions became highly favorable for insect population increases throughout Southwest Oregon. The Canyonville/Canyon Creek WAU had very little blowdown associated with the storms of 1996 and would be considered a low risk area for a bark beetle outbreak.

Mountain pine beetle (Dendroctonus ponderosae) and western pine beetle (Dendroctonus brevicomis) also attack trees that are stressed by drought or root disease. However, infestations are more strongly correlated with low host vigor resulting from overstocking. The major hosts of the mountain pine beetle are ponderosa, white, and sugar pines. Western pine beetle infests ponderosa pine.

Insect attacks and outbreaks are almost always associated with conditions that stress the tree. When epidemic insect populations are reached, healthy trees may be attacked and killed. Direct control measures are impractical and generally not recommended. Forest damage can be reduced, indirectly, by thinning. Keeping trees in a healthy, vigorous condition is the most practical means of reducing the impact from bark beetles (Filip and Schmitt 1990).

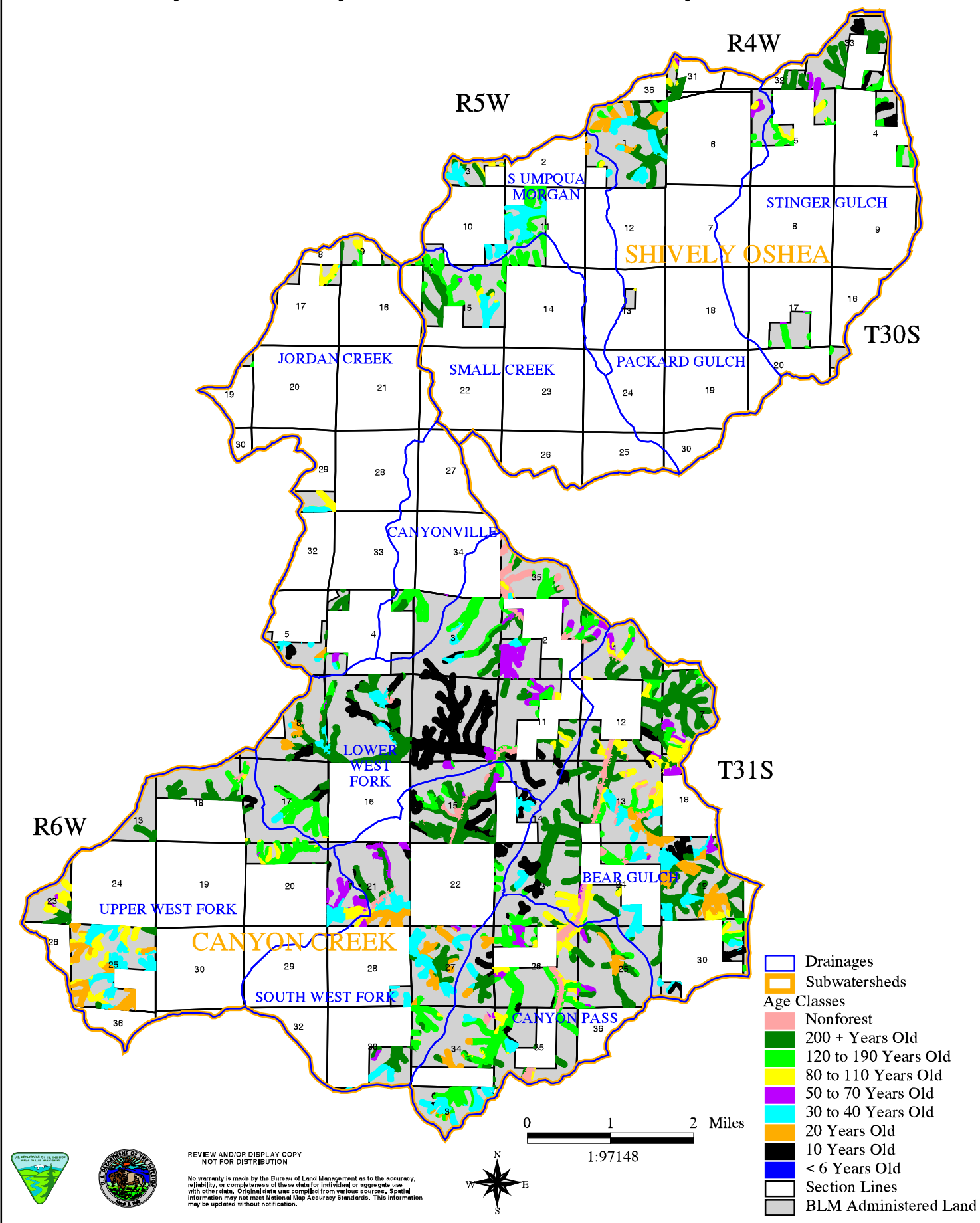
c. Riparian Vegetation

Riparian Reserves within the Canyonville/Canyon Creek WAU and outside of the LSR account for approximately 25 percent (4,044 acres out of 16,174 acres) of BLM administered land (see Table 5 and Map 9). The purpose of Riparian Reserves is to maintain and restore riparian structures and functions of intermittent streams, confer benefits to riparian-dependent and associated species other than fish, enhance

Table 5. Riparian Reserve Age Class Distribution Outside of the LSR.

	Nonforest		Early Seral (0 to 30 Years Old)		Mid Seral (31 to 80 Years Old)		Late Seral (80 + Years Old)		
Area	Acres	%	Acres	%	Acres	%	Acres	%	Total Acres
Bear Gulch	37	12	54	18	1	0	205	69	297
Canyon Pass	20	4	103	21	81	17	281	58	485
Canyonville	0	0	0	0	0	0	49	100	49
Jordan Creek	0	0	22	23	14	14	61	63	97
Lower West Fork	27	3	440	42	133	13	455	43	1,055
South West Fork	30	4	176	24	171	23	351	48	728
Upper West Fork	9	2	89	17	170	33	249	48	517
Canyon Creek Subwatershed	123	4	884	27	570	18	1,651	51	3,228
Packard Gulch	0	0	89	37	17	7	137	56	243
South Umpqua Morgan	0	0	16	10	97	58	55	33	168
Small Creek	0	0	0	0	26	14	154	86	180
Stinger Gulch	0	0	40	18	17	8	168	75	225
Canyonville Portion of Shively-O'Shea Subwatershed	0	0	145	18	157	19	514	63	816
Canyonville/Canyon Creek Watershed Analysis Unit	123	3	1,029	25	727	18	2,165	54	4,044

Map 9. Riparian Reserve Age Class Distribution Within the Canyonville/Canyon Creek Watershed Analysis Unit



conservation for organisms that are dependent on the transition zone between upslope and riparian areas, improve travel and dispersal corridors for many terrestrial animals and plants, and provide greater connectivity of the watershed (USDA and USDI 1994b). Silvicultural treatments applied within Riparian Reserves would be to control stocking, reestablish, establish, or maintain desired vegetation characteristics to attain Aquatic Conservation Strategy objectives.

For this analysis, Riparian Reserve widths were developed using a site potential tree height of 160 feet. All intermittent streams were given a Riparian Reserve width of 160 feet on each side of the stream. Perennial streams were given a Riparian Reserve width of 320 feet (2 times the site potential tree height) on each side of the stream. Actual projects would use site specific information for determining if a stream needed a Riparian Reserve width of 160 feet or 320 feet.

Riparian Reserve widths may be adjusted following watershed analysis, a site specific analysis, and describing the rationale for the adjustment through the appropriate NEPA decision making process (USDI 1995). Critical hillslope, riparian, channel processes and features, and the contribution of Riparian Reserves to benefit aquatic and terrestrial species would be the basis for the analysis. At a minimum, a fisheries biologist, soil scientist, hydrologist, botanist, and wildlife biologist would be expected to conduct the analysis for adjusting Riparian Reserve widths.

d. Private Lands

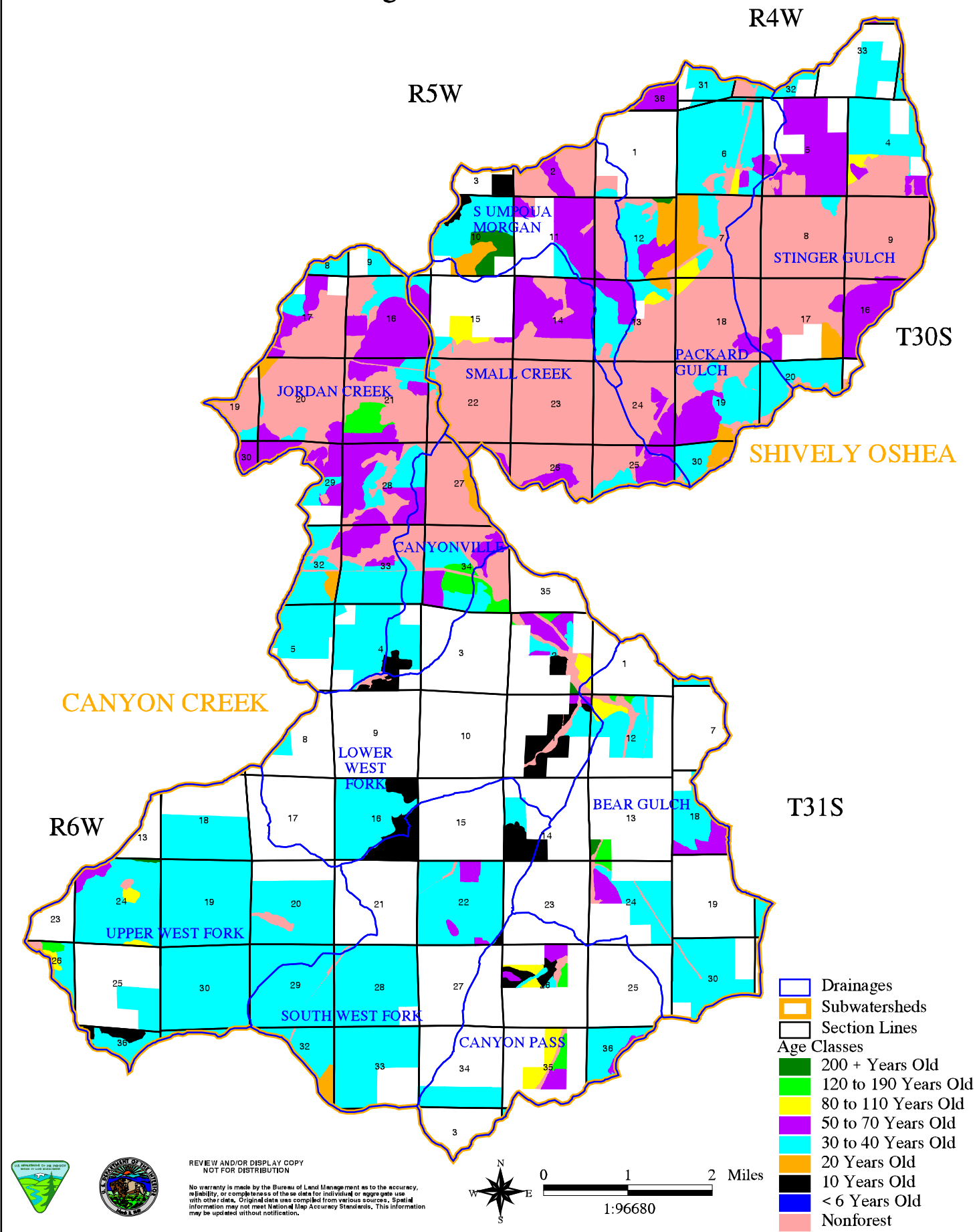
Private lands account for approximately 63% (27,830 acres) of the Canyonville/Canyon Creek WAU (see Table 6 and Map 10). Private ownership located in the interior valleys along the South Umpqua River consists mainly of agricultural and urban lands (9,530 acres). The rest of the private lands are mainly forested lands intermingled with BLM administered lands. Approximately 47 percent of the private lands have been harvested within the past 40 years.

Although private lands are a major component of this Watershed Analysis Unit (63%), the focus of this analysis will be on BLM administered lands. Private forested lands are in a constant state of change and will continue to be harvested when growth and economic factors provide a satisfactory return to the landowner. The BLM cannot predict the timing or amount of harvesting which may occur on private lands in this WAU.

Table 6. 1997 Private Land Age Class Distribution.

	Number of Acres by Age Class and Percent of Total																		
AREA	Nonforest	%	< 5	%	10	%	20	%	30 to 40	%	50 to 70	%	80 to 110	%	120 to 190	%	200 +	%	TOTAL
Bear Gulch	133	9	0	0	21	1	0	0	1,023	73	137	10	42	3	39	3	9	1	1,404
Canyon Pass	39	6	0	0	64	9	0	0	345	51	87	13	108	16	32	5	0	0	675
Canyonville	584	48	0	0	35	3	28	2	339	28	153	13	0	0	68	6	0	0	1,207
Jordan Creek	1,877	39	0	0	2	0	57	1	1,498	31	1,231	26	0	0	100	2	0	0	4,765
Lower West Fork	252	20	0	0	262	20	0	0	566	44	116	9	35	3	56	4	4	0	1,291
South West Fork	30	1	0	0	210	8	41	2	2,291	87	55	2	0	0	0	0	0	0	2,627
Upper West Fork	44	1	0	0	12	0	40	1	3,272	94	39	1	41	1	21	1	6	0	3,475
Canyon Creek Subwatershed	2,959	19	0	0	606	4	166	1	9,334	60	1,818	12	226	1	316	2	19	0	15,444
Packard Gulch	1,639	41	0	0	0	0	347	9	1,438	36	488	12	69	2	0	0	8	0	3,989
South Umpqua Morgan	527	32	0	0	70	4	60	4	426	26	447	27	0	0	0	0	96	6	1,626
Small Creek	2,193	73	0	0	0	0	6	0	171	6	575	19	56	2	0	0	0	0	3,001
Stinger Gulch	2,212	59	0	0	0	0	53	1	690	18	778	21	37	1	0	0	0	0	3,770
Portion of WAU in the Shively-O'Shea Subwatershed	6,571	53	0	0	70	1	466	4	2,725	22	2,288	18	162	1	0	0	104	1	12,386
Canyonville/Canyon Creek Watershed Analysis Unit	9,530	34	0	0	676	2	632	2	12,059	43	4,106	15	388	1	316	1	123	0	27,830

Map 10. Canyonville/Canyon Creek Watershed Analysis Unit
Private Age Class Distribution



C. Geology, Soils, and Erosion Processes

1. Geology

The Canyonville/Canyon Creek watershed is composed of sedimentary and volcanic rocks of the Klamath Mountains geologic province. The following list of the geologic formations located within the Watershed Analysis Unit includes a short description of each type. Geology formations are shown on Map 11. The Geologic Map of Oregon by George W. Walker and Norman S. MacLeod (1991) is the source of information for the geology section.

Coast Range and Klamath Mountains
Sedimentary and volcanic rocks

Js - 6,125 acres

Sedimentary rocks (Jurassic) - Black and gray mudstone, shale, siltstone, graywacke, andesitic to dacitic water-laid tuff, porcelaneous tuff, and minor interlayers and lenses of limestone and fine-grained sediments metamorphosed to phyllite or slate. Locally includes some felsite, andesite and basalt flows, breccia, and agglomerate.

Jv - 24,166 acres

Volcanic rocks (Jurassic) - Lava flows, flow breccia, and agglomerate dominantly of plagioclase, pyroxene, and hornblende porphyritic and aphyric andesite. Includes flow rocks that range in composition from basalt to rhyolite as well as some interlayered tuff and tuffaceous sedimentary rocks. Commonly metamorphosed to greenschist facies; locally foliated, schistose or gneissic.

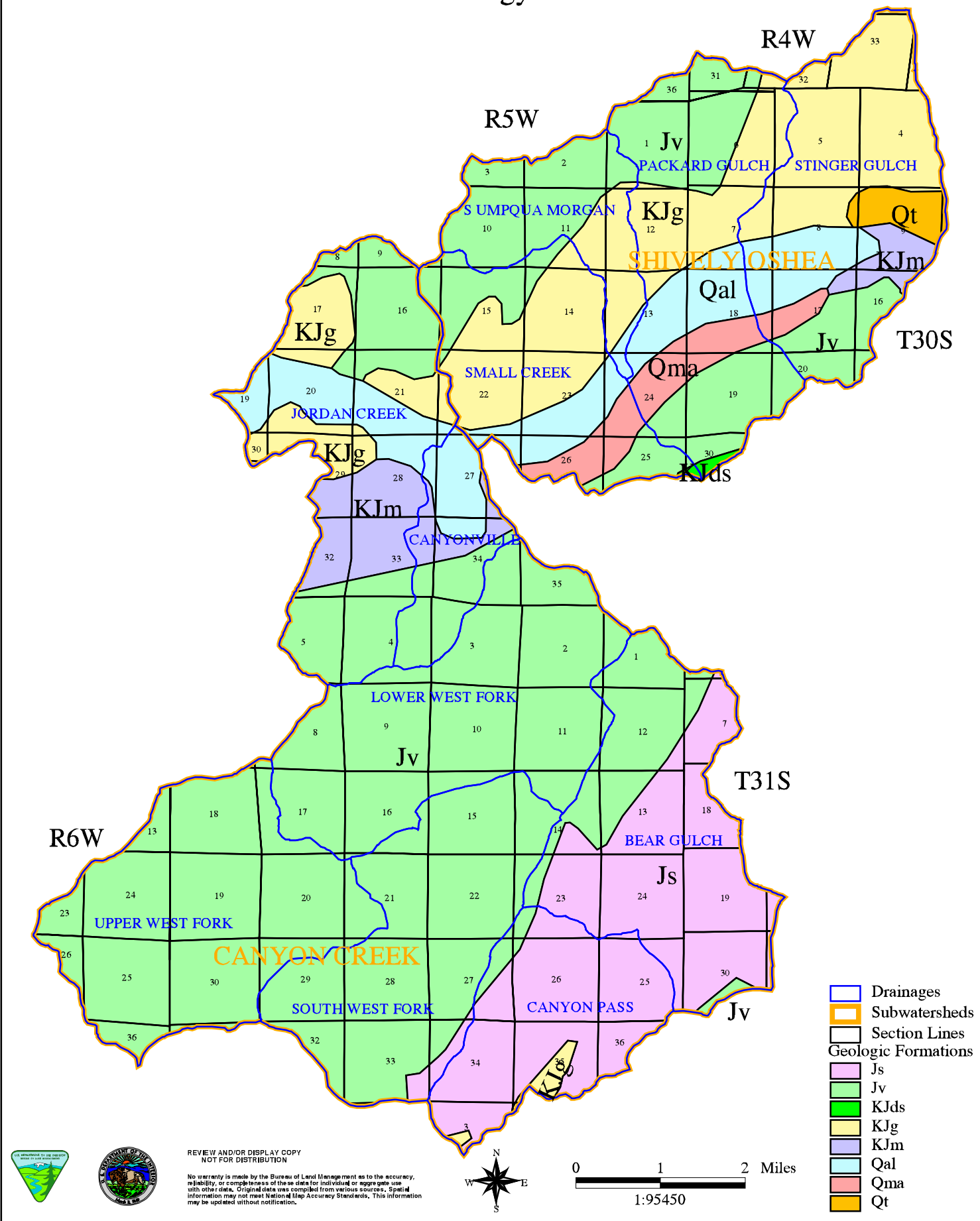
KJds - 57 acres

Dothan Formation and related rocks (Lower Cretaceous and Upper Jurassic) - Sedimentary rocks - Sandstone, conglomerate, graywacke, rhythmically banded chert lenses.

KJm - 1,661 acres

Myrtle Group (Lower Cretaceous and Upper Jurassic) - Conglomerate sandstone, siltstone, and limestone. Locally fossiliferous.

Map 11. Canyonville/Canyon Creek WAU Geology



Coast Range and Klamath Mountains
Intrusive rocks

KJg - 7,118 acres

Granitic rocks (Cretaceous and Jurassic) - Mostly tonalite and quartz diorite but including lesser amounts of other granitoid rocks.

Coast Range and Klamath Mountains and Cascade Range
Sedimentary and volcanic rocks

Qal - 3,474 acres

Alluvial deposits (Holocene) - Sand, gravel, and silt forming flood plains and filling channels of present streams. In places includes talus and slope wash. Locally includes soils containing abundant organic material and thin peat beds.

Qt - 353 acres

Terrace, pediment, and lag gravels (Holocene and Pleistocene) - Unconsolidated deposits of gravel, cobbles, and boulders intermixed and locally interlayered with clay, silt, and sand. Mostly on terraces and pediments above present flood plains. Locally fossiliferous.

Cascade Range
Sedimentary and volcanic rocks

Qma - 1,049 acres

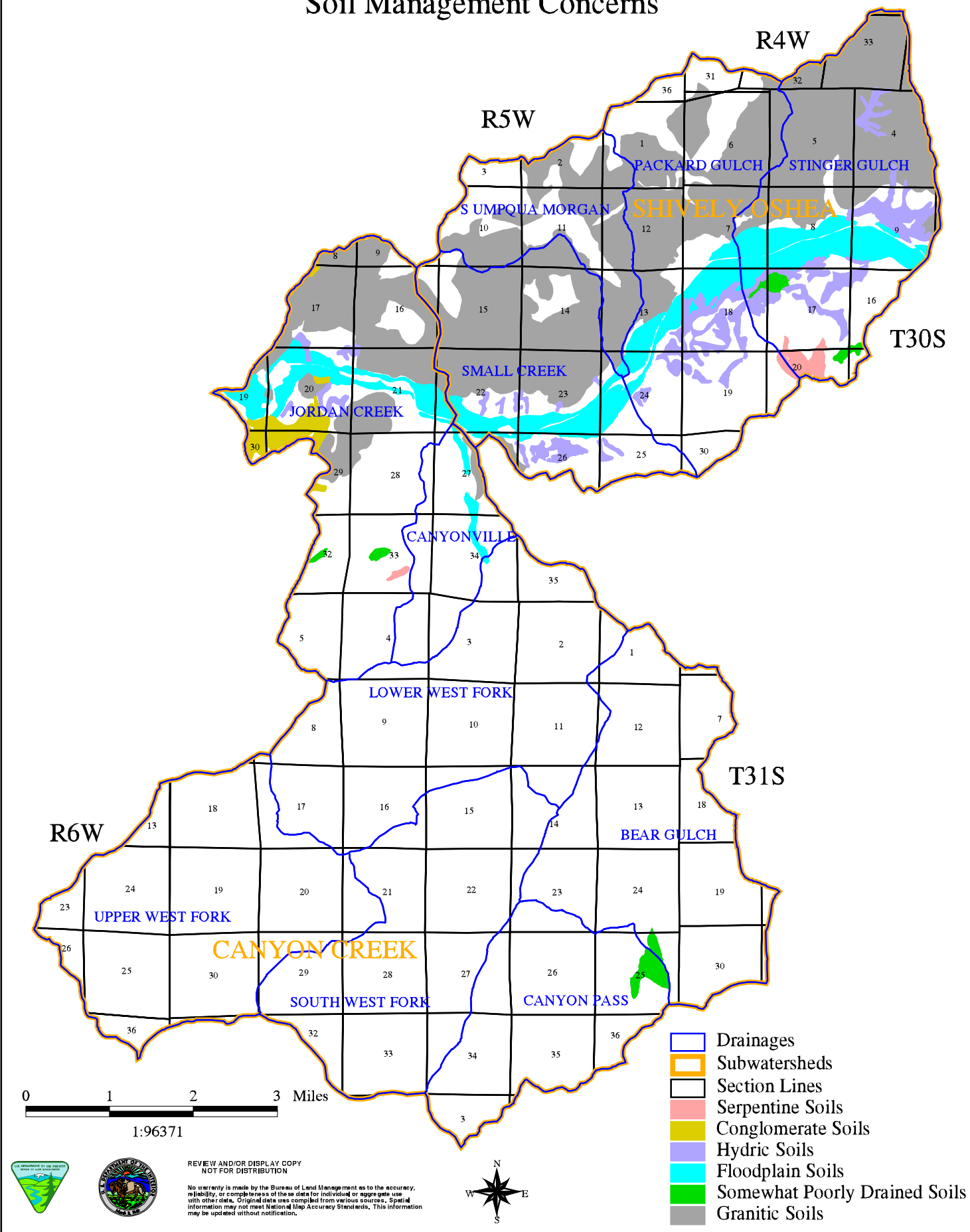
Mazama ash-flow deposits (Holocene) - Rhyodacitic to andesitic ash-flow deposits related to climactic eruptions of Mount Mazama about 6,845 yr before the present time (B.P.).

2. Soils

The National Cooperative Soil Survey (NCSS), Douglas County Area, conducted by the Natural Resources Conservation Service (NRCS) and the Timber Production Capability Classification (TPCC) conducted by the Bureau of Land Management are the main sources of information for the soils section. The NCSS data includes soils information on private as well as BLM administered lands. The TPCC data only includes information from BLM administered lands.

Soils in the Canyonville/Canyon Creek Watershed Analysis Unit have developed dominantly from sedimentary and volcanic parent materials within the Klamath Mountains geologic province. The main soils related properties considered to be significant for planning and analysis are somewhat poorly drained soils, serpentine soils, hydric soils, granitic soils, floodplain soils, and soils formed from conglomerates (see Map

Map 12. Canyonville/Canyon Creek WAU
Soil Management Concerns



12 and Table 7). Additional properties determined to be significant, using the TPCC, are nonsuitable woodlands due to mass movement, slope gradient, or soils with droughtiness.

Table 7. Soil Management Concerns Within the Canyonville/Canyon Creek WAU.

Drainage **Subwatershed**	Somewhat Poorly Drained Soils (SWP)		Serpentine Soils		Hydric Soils		Granitic Soils		Floodplain Soils		Conglomerate Soils	
	Private	BLM	Private	BLM	Private	BLM	Private	BLM	Private	BLM	Private	BLM
Bear Gulch	0	18	0	0	0	0	0	18	0	0	0	0
Canyon Pass	0	76	0	0	0	0	0	76	0	0	0	0
Canyonville	0	0	0	0	0	0	37	0	59	0	0	0
Jordan Creek	20	0	10	0	63	0	1,386	108	379	0	231	5
Lower West Fork	0	0	0	0	0	0	0	0	2	0	0	0
South West Fork	0	0	0	0	0	0	0	0	0	0	0	0
Upper West Fork	0	0	0	0	0	0	0	0	0	0	0	0
Canyon Creek Subwatershed	20	94	10	0	63	0	1,423	202	440	0	231	5
Packard Gulch	24	0	15	0	270	0	1,269	354	349	0	0	0
South Umpqua Morgan	0	0	0	0	0	0	1,008	106	10	0	0	0
Small Creek	17	0	0	0	119	0	1,392	441	350	0	0	0
Stinger Gulch	65	2	85	8	424	0	1,541	587	583	0	0	0
Portion of WAU in **Shively-O'Shea Subwatershed**	106	2	100	8	813	0	5,210	1,488	1,292	0	0	0
Canyonville/Canyon Creek WAU	126	96	110	8	876	0	6,633	1,690	1,732	0	231	5

a. NCSS - Somewhat Poorly Drained (SWP) soils

There are 126 acres of somewhat poorly drained soils on private land and 96 acres on BLM administered land in this WAU. Most of these soil types on BLM administered land occur in the Canyon Pass and Bear Gulch Drainages. Somewhat poorly drained soils may include riparian areas and have slope stability problems. Windthrow can occur more often on these soils. Hydric or wet soil areas too small for mapping (NCSS standards <5 acres) exist as minor components within areas mapped as somewhat poorly drained.

b. NCSS - Serpentine soils

There are 110 acres of serpentine soils on private lands and eight acres on BLM administered lands in this WAU. The serpentine soils on BLM administered lands occur in the Stinger Gulch Drainage. Serpentine soils generally have high amounts of magnesium and iron and low amounts of nitrogen, phosphorus, potassium, and molybdenum. Douglas-fir productivity is poor. However, grasses grow rapidly on serpentine soils. Existing native forest vegetation is best suited for areas with serpentine soils. Stand conversion to another commercial forest type is risky and should be approached with caution.

c. NCSS - Hydric soils

There are 875 acres of hydric soils in this WAU, occurring only on private lands. Hydric soils generally have a watertable within ten inches of the soil surface for at least five percent of the growing season. The current definition of a hydric soil from the NRCS is "a soil that is sufficiently wet in the upper part to develop anaerobic conditions during the growing season". These areas have the greatest potential to be classified as wetlands.

d. NCSS - Granitic soils

There are 6,633 acres of granitic soils mapped on private land and 1,691 acres on BLM administered land in this WAU. Granitic soils are highly susceptible to surface erosion and shallow slope failures, have low organic carbon reserves, and are not very resilient. Most of the granitic soils on BLM administered land are in the Stinger Gulch, Small Creek, and Packard Gulch Drainages.

e. NCSS - Floodplain soils

There are 1,733 acres of floodplain soils in the Canyonville/Canyon Creek WAU. They only occur on non-timber industry owned private lands.

f. NCSS - Conglomerate soils

There are 231 acres of conglomerate soils occurring on private lands and five acres on BLM administered land in this WAU. When exposed to the elements, conglomerates tend to weather unevenly producing unpredictable slope stability. Dry ravel erosion occurs on steep hill slopes producing high rock fragment content in the soil surface layers. This added doughtiness makes it more difficult to establish tree seedlings.

g. Timber Production Capability Classification - Fragile Soil Classifications

Timber Production Capability Classification fragile soil sites are areas where the timber growing potential is reduced due to inherent soil properties and landform characteristics. The TPCC groups sites into Fragile Suitable and Fragile Not Suitable for timber production classifications. Fragile Suitable sites have the

potential for unacceptable soil productivity losses as a result of forest management activities unless mitigating measures are applied to protect the soil/site productivity (see Best Management Practices, Appendix D, Roseburg District Resource Management Plan, USDI 1995). Fragile Not Suitable sites are considered to be unsuitable for timber production and are withdrawn from the timber base. Table 8 lists the number of acres in each classification on BLM administered land within the WAU.

Table 8. Fragile Soil Classifications on BLM Administered Land.

Drainage **Subwatershed**	FGNW	FPNW	FSNW	FGR/RMR	FGR/RTR
Bear Gulch	3	4	239	664	352
Canyon Pass	0	0	0	32	0
Canyonville	0	0	0	0	0
Jordan Creek	0	0	73	1	18
Lower West Fork	0	1	0	41	1
South West Fork	0	0	360	0	0
Upper West Fork	0	0	298	0	0
Canyon Creek Subwatershed	3	5	970	738	371
Packard Gulch	0	4	0	269	0
South Umpqua Morgan	0	0	0	184	0
Small Creek	0	0	0	143	3
Stinger Gulch	1	0	0	2	0
Portion of WAU in **Shively-O'Shea Subwatershed**	1	4	0	598	3
Canyonville/Canyon Creek WAU	4	9	970	1,336	374

1) Landslides

Landslides can affect water quality, erosion, and sedimentation. Landslides occur naturally or may be triggered by human activities such as road building or logging. Map 13 shows the potential stability problem areas.

a) TPCC - Fragile Nonsuitable: Slope Gradient (FGNW)

Shallow translational debris type landslides can occur on steep slopes (60% to 100% plus). These slides are generally fast acting and produce short duration sediment effects. These areas have a high potential for shallow translational debris type landslides and are not suitable for forest management activities. Bear Gulch and Stinger Gulch Drainages contain all four acres in this classification.

b) TPCC - Fragile Nonsuitable: Mass Movement Potential (FPNW)

These sites contain active deep-seated slump-earthflow types of mass movements. These slide types have the potential to produce long duration sediment effects. These areas are considered to be unsuitable for forest management activities and have been withdrawn from the timber base. Nine acres with mass movement potential occur in the Bear Gulch, Packard Gulch and Lower West Fork Drainages.

2) Soil Moisture and Productivity

Soils with an available water holding capacity between 0.5 and 1.5 inches of water per inch of soil are difficult to reforest. Moisture availability decreases even more on southerly aspects.

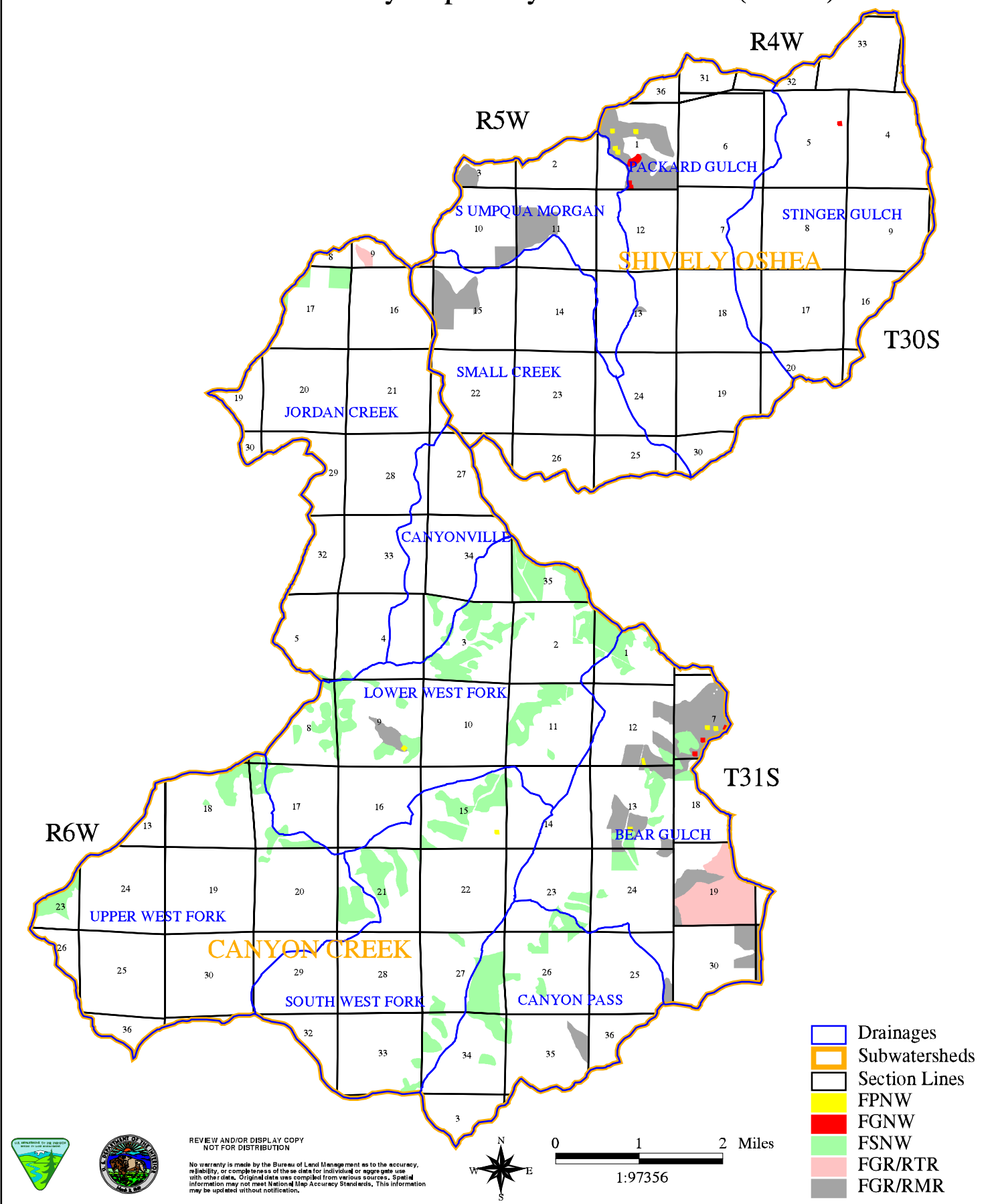
a) TPCC - Fragile Nonsuitable: Soil Moisture (FSNW)

There are 970 acres of nonsuitable soils due to low soil moisture occurring mostly in the Bear Gulch, South West Fork, and Upper West Fork Drainages. These sites are determined to be unsuitable for forest practices due to moisture deficiencies based on soil physical characteristics. Moisture deficient soils in this WAU are dominantly less than 20 inches to bedrock, have a low organic matter content, and are loamy textured with 50 to 80 percent rock fragments throughout the soil profile. There is less than one inch of available water holding capacity in the top 12 inches of the soil surface for these soils.

b) TPCC - Fragile Suitable: Slope Gradient/Soil Moisture (FGR/RMR)

There are 1,336 acres classified as Fragile Slope Gradient/Soil Moisture occurring mostly in the Bear Gulch, Packard Gulch, South Umpqua Morgan, and Small Creek Drainages. These areas are characterized by slopes ranging from 60% to 100% plus. Unacceptable soil and organic matter losses can occur on these sites as a result of forest management activities unless mitigating measures are applied to protect the soil/site productivity (see Best Management Practices, Appendix D, Roseburg District Resource

Map 13. Canyonville/Canyon Creek WAU
Fragile Soil Classifications from the Timber Productivity Capability Classification (TPCC)



Management Plan, USDI 1995). These sites also have low available soil moisture due to low growing season precipitation and/or competing vegetation that reduces conifer seedling survival.

c) TPCC - Fragile Suitable: Slope Gradient/Temperature (FGR/RTR)

There are 374 acres classified as Fragile Slope Gradient/Temperature occurring mostly in the Bear Gulch Drainage. These areas are characterized by slopes ranging from 60% to 100% plus. Unacceptable soil and organic matter loses can occur on these sites as a result of forest management activities unless mitigating measures are applied to protect the soil/site productivity (see Best Management Practices, Appendix D, Roseburg District Resource Management Plan, USDI 1995). These sites also have a high amount of solar radiation input in combination with low available soil moisture due to low growing season precipitation and/or competing vegetation that limits conifer seedling survival.

D. Hydrology

1. Climate

The Canyonville/Canyon Creek Watershed Analysis Unit has a Mediterranean type of climate, characterized by cool, wet winters and hot, dry summers. The closest National Oceanic and Atmospheric Administration (NOAA) weather station to the WAU is Riddle. The Riddle weather station, located approximately 1½ miles west of the WAU, was used to characterize both temperatures and precipitation in the WAU. Since the weather station was moved in 1949, the data in Table 9 is separated to show the Period of Record at each location. Temperature data is only available from 1949 to 1997.

Table 9. Riddle Weather Station Data Used to Characterize Climate in the Canyonville/Canyon Creek WAU.

Elevation (feet)	Period of Record (water year)	Mean Water Year Precipitation (inches)	Mean Annual Temperature (degrees Fahrenheit)
680	1914-1948	29.6	N/A
680	1949-1997	31.7	54.2

The Riddle weather station is at about the same elevation as the lowest point in the WAU. Because of orographic effects, precipitation differences could be expected to occur throughout the WAU, with the most precipitation occurring at the highest elevations. Annual precipitation in the WAU ranges from about 30 inches at Canyonville to 60 inches at the highest elevations. Most precipitation occurs as rainfall. However, some of the Canyon Creek Subwatershed is above 2,000 feet in elevation and could receive a significant amount of snow. Temperature differences would also be expected due to aspect and elevational differences that occur throughout the WAU. Summer maximum daily temperatures at Riddle are in the low 90s EF and winter minimum daily temperatures are in the mid 30s EF.

Chart 3 shows approximately 85% of the annual precipitation occurs between October and April, and summer precipitation averages about four inches. Chart 4 shows the deviation from the mean of annual precipitation at Riddle from 1914 to 1948. Chart 5 shows the annual deviation of temperature and precipitation from the mean at Riddle from 1949 to 1997, which is after the station was moved. Charts 4 and 5 also characterize the data as being cool or warm and wet or dry. Chart 6 shows annual precipitation from 1914 to 1997 at Riddle, with the year indicated when the station moved. Gaps in the data in Charts 4, 5, and 6 are years when at least 350 daily observations were not recorded.

Chart 3. Monthly Precipitation at Riddle From 1949 to 1997

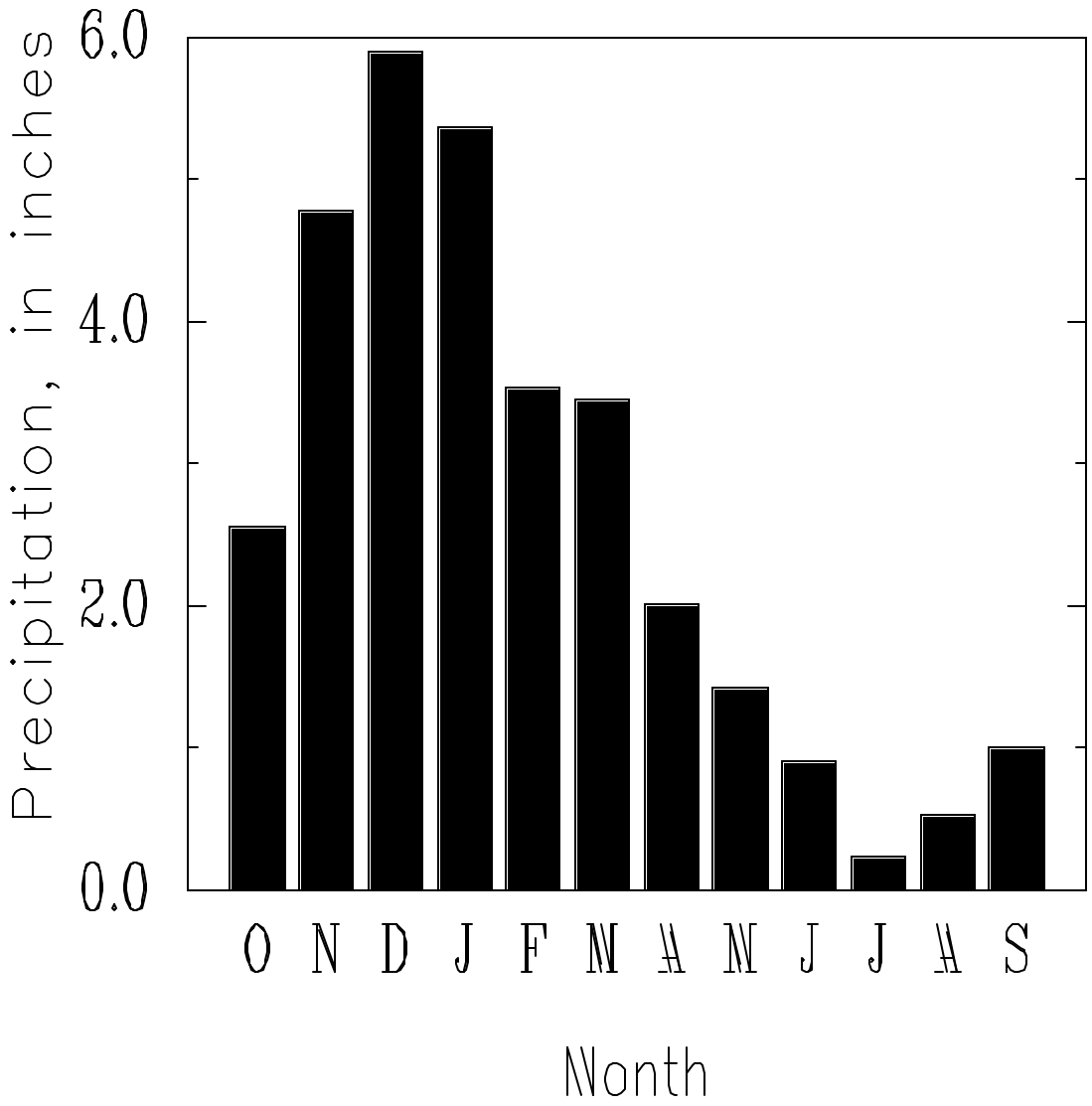


Chart 4. Deviation From the Mean Annual Precipitation of 29.6 Inches at Riddle From 1914 to 1948.

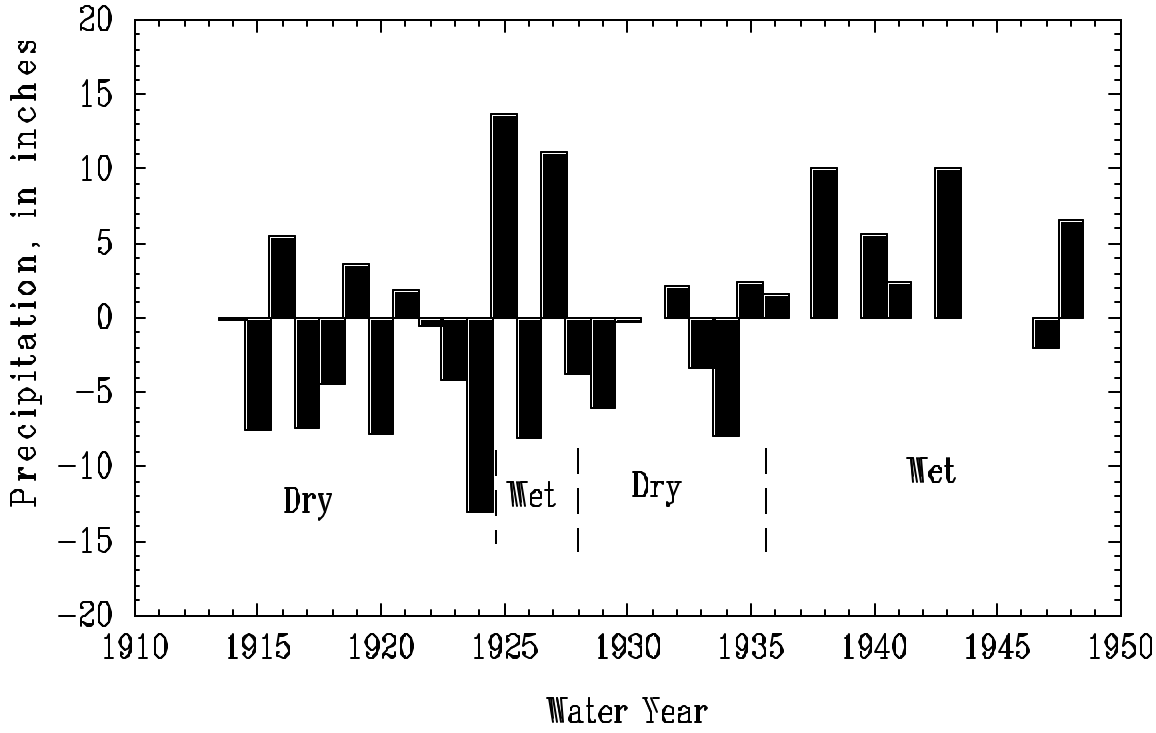


Chart 5. Annual Deviation of Temperature and Precipitation From the Mean at Riddle From 1949 to 1997.

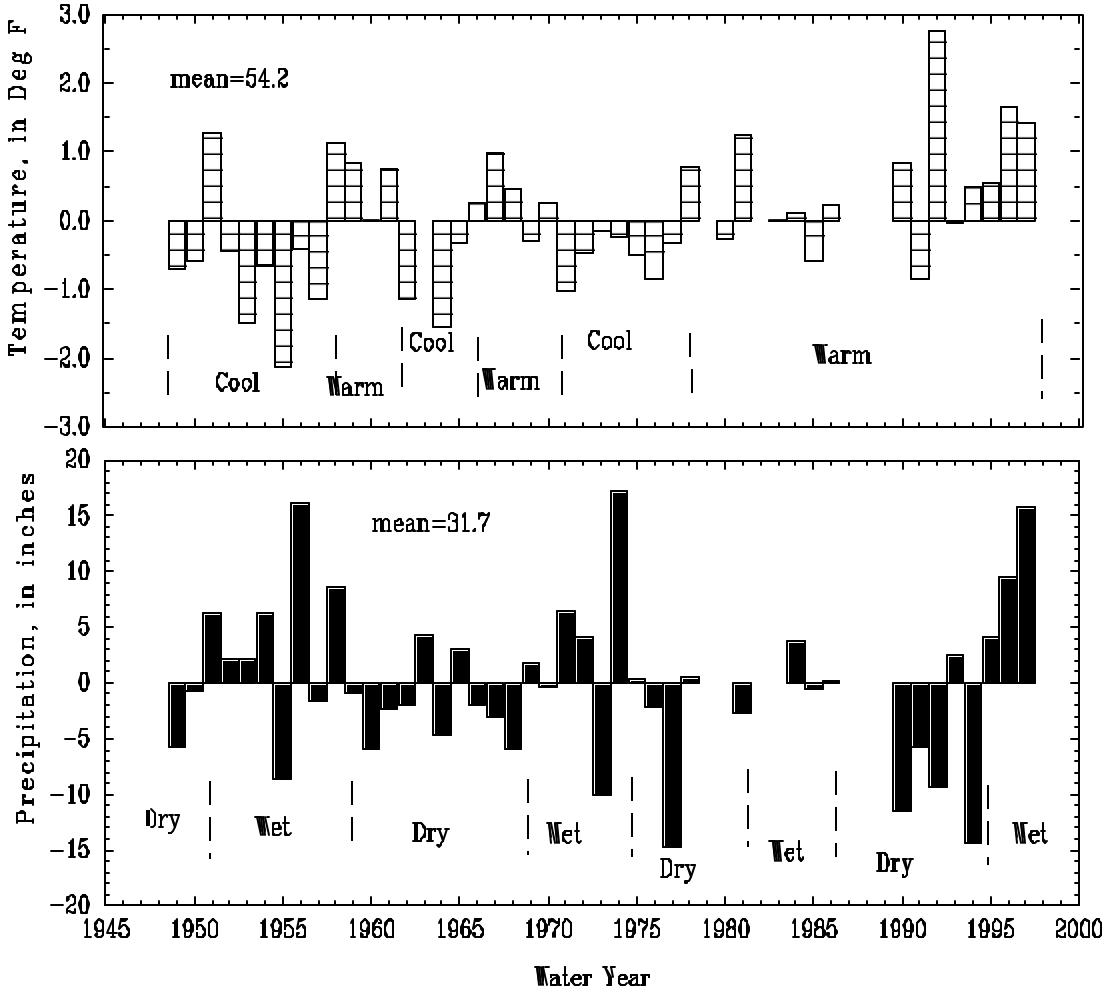
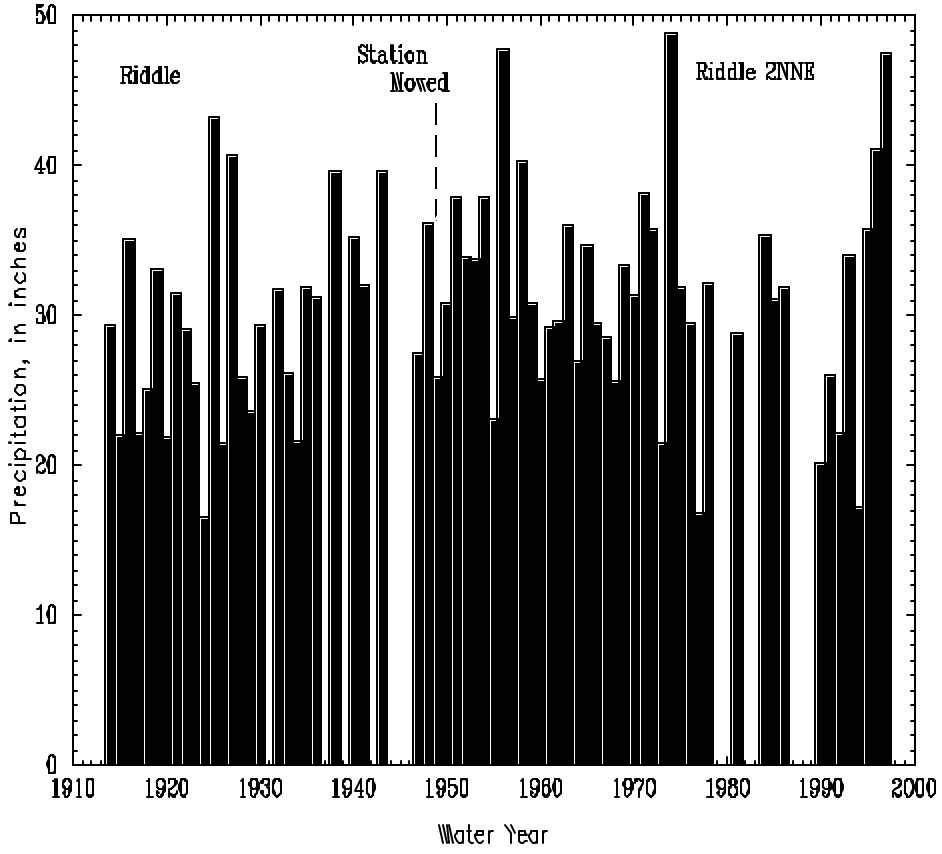


Chart 6. Precipitation at Riddle From 1914 to 1997.



2. Municipal Watersheds, Groundwater and Water Rights

The city of Canyonville stores water in Win Walker Reservoir on the West Fork of Canyon Creek. This reservoir has a 58 foot high dam and a storage capacity of 300 acre feet of water. Water from the reservoir and Canyon Creek provide drinking water for the city of Canyonville. Canyonville also obtains water from O'Shea Creek, which is not within this WAU. The BLM and the city of Canyonville entered into a Memorandum of Understanding in 1982 to protect the quality of water within Canyon Creek.

No definite pattern exists in the various chemical types found in the groundwater of the area (Frank 1979). The variations depend mainly on the rock type forming the aquifer, the topography, and in some places, the depth of the well. The majority of the WAU contains Jurassic volcanic rocks, with smaller areas of alluvium, Cretaceous sedimentary rocks, and Cretaceous and Jurassic intrusive rocks (Frank 1979). Yields from wells range from less than five gallons per minute in the volcanic rocks to between 50 and 100 gallons per minute in the alluvium. Wells within the WAU yield from less than one gallon per minute to 40 gallons per minute with the majority of the wells providing less than 10 gallons per minute.

Approximately 38.9 cubic feet per second (cfs) of water has been appropriated to water users within this WAU. The water is used for domestic drinking water, irrigation, fish, mining, livestock, and municipal uses. The majority of the water (approximately 30.4 cfs) is allocated from the South Umpqua River. Jordan and Alder Creeks have approximately 3.3 cfs allocated, Canyon Creek and the West Fork of Canyon Creek have approximately 2.5 cfs allocated, and approximately 2.7 cfs is allocated from small unnamed streams, springs, and tributaries to the South Umpqua River.

3. Streamflow

Streamflow data collected within the WAU included a crest-stage gaging station located on Canyon Creek. This gage measured annual peak flows from 1953 until measurements were discontinued in 1966. Table 10 shows recurrence intervals and exceedence probabilities calculated from the 14 years of record. The gage recorded the highest annual peak flow of 3,810 cfs on December 12, 1955 and the lowest annual peak flow of 595 cfs was recorded on December 31, 1954. The drainage area above the gage is 36.9 square miles, elevation at the gage is 770 feet, and mean basin elevation is 2,100 feet.

A stream gage on the West Fork of Canyon Creek has been in operation since 1983. Since the BLM is not a cooperator to this gage, the stream gage information was not available at the time this watershed analysis was prepared.

4. Transient Snow Zone

The Transient Snow Zone (TSZ) is defined as lands between 2,000 and 5,000 feet in elevation. Timber harvesting and road building within the TSZ can result in increased peak flows during warm rain-on-snow events. Harr and Coffin (1992) noted that snow stored under a forest canopy of at least 70% crown

closure was less susceptible to rapid snowmelt than snow accumulation in openings. A procedure developed by the Umpqua National Forest (USDA 1990) for estimating cumulative effects in the TSZ is called the Hydrologic Recovery Procedure (HRP). According to the HRP, if more than 25% of a drainage is considered to be unrecovered, timber harvesting may increase peak flows. The HRP is a reference for cumulative effects within the TSZ and assumes that land below 2,000 feet and above 5,000 feet in elevation is 100% recovered. Other models would need to be used to estimate cumulative effects on land outside of the TSZ. Increased peak flows following timber harvesting within the TSZ could lead to an increase in landslides and erosion (Harr 1981).

Table 10. Recurrence Intervals on Canyon Creek at Canyonville From 1953 to 1966.

Recurrence Interval (years)	1.25	2.5	5	7.5	15
Annual Exceedence Probability	80%	40%	20%	13.3%	6.67%
Discharge (cfs)	1,820	2,620	3,060	3,410	3,810

Approximately 48% of the land in the Canyon Creek Subwatershed is within the TSZ. The HRP is shown in Table 11. Less than one percent of the Shively-O'Shea Subwatershed included in this WAU is within the TSZ, so the HRP was not figured for those drainages.

Table 11. Canyonville/Canyon Creek WAU Hydrologic Recovery Percentages.

Drainage	Total Acres	Total Acres in TSZ	HRP (% recovered)
Bear Gulch	4,763	1,969	95%
Canyon Pass	2,991	2,147	92%
Canyonville	1,409	290	97%
Jordan Creek	5,189	589	99%
Lower West Fork	5,309	2,479	86%
South West Fork	4,517	2,201	93%
Upper West Fork	5,112	4,276	96%

Table 12 shows the percentage of forested land less than 30 years old by Drainage.

Table 12. Percent of Drainages Less Than 30 Years Old.

Drainage **Subwatershed**	Total Acres	Total Acres BLM	Total Acres Private	Percent Less Than 30 Years Old	Percent of BLM Administered Land Less Than 30 Years Old	Percent of Private Land Less Than 30 Years Old
Bear Gulch	4,763	3,361	1,403	13.5	19.5	1.7
Canyon Pass	2,991	2,316	676	16.2	18.8	10.1
Canyonville	1,409	201	1,208	4.9	2.5	10.2
Jordan Creek	5,189	423	4,766	4.9	27.0	4.9
Lower West Fork	5,309	4,017	1,291	30.3	35.8	25.2
South West Fork	4,517	1,889	2,627	15.6	24.9	9.7
Upper West Fork	5,112	1,637	3,475	5.8	11.3	3.3
Canyon Creek Subwatershed	29,290	13,844	15,446	13.9	22.7	5.0
Packard Gulch	4,652	663	3,988	12.3	33.8	14.8
South Umpqua Morgan	2,026	400	1,626	9.5	15.4	11.9
Small Creek	3,544	544	3,000	0.2	0.0	0.8
Stinger Gulch	4,494	723	3,770	4.8	11.9	8.2
Portion of WAU in **Shively-O'Shea Subwatershed**	14,716	2,330	12,384	6.7	16.0	4.3
Canyonville/Canyon Creek WAU	44,006	16,174	27,830	11.5	21.8	4.7

A Proper Functioning Condition (PFC) survey was conducted on the West Fork of Canyon Creek. The survey determined the stream channel is incised and continuing to downcut causing accelerated bank erosion, floodplain abandonment, and straightening of the stream channel. Some causes include the lack of large woody debris (LWD), past management activities upstream of the surveyed reach, and wildfire.

Timber harvesting and road building have the potential to increase peak flows above normal rates, add sediments to the stream, increase the risk of landslides after harvesting, increase the risk of landslides resulting from road and/or culvert failures, increase stream temperature, and change the morphology of the stream channel (Beschta 1978, Harr and McCorison 1979, Jones and Grant 1996, and Wemple et al. 1996). Although, many of these impacts can be mitigated or lessened with improved management techniques, past practices would still have some impacts on the hydrology in the WAU.

Roads have the potential to extend the stream network and increase peak flows by delivering water to the stream channel faster than in a non-roaded landscape. Roads can also increase the stream drainage network by routing water into culverts, which if not properly located can cause gullying, effectively acting as another stream channel (Wemple et al. 1996). Sedimentation can be increased by accelerated erosion due to culverts draining onto unstable or erosive slopes or when having too few culverts causes downcutting of the ditchline. A number of Drainages in the WAU have high road densities, as well as high stream crossing densities (see Table 13). Drainages with high road and stream crossing densities and a large amount of land in the TSZ are especially susceptible to increased peak flows.

Culverts can influence the stream channel by limiting stream meandering, changing stream gradient, limiting bedload movement, and increasing sediment due to culvert failures. Areas with the highest number of stream crossings have the greatest risk of culverts failing or becoming blocked during storm events and causing increased erosion, road failures, or debris slides. Only a limited number of the culverts in this WAU have been inspected and/or maintained. The Resource Management Plan (RMP) states culverts are supposed to be able to accommodate a 100-year flood event.

Field review of the WAU has shown many roads are in need of some routine maintenance. Maintenance that needs to be performed includes removing slides blocking the ditchline or culverts and adding additional culverts and/or waterbars to the road to reduce the amount of flow reaching a stream channel and increasing infiltration of the intercepted flow. Maintenance needs also include grading roads to reduce the amount of water flowing in ruts on the road. Water in the ruts can flow for long distances carrying the sediment eroded from the road surface into a stream. Mulching bare cutbanks and fill slopes to lessen surface erosion and limiting access to unsurfaced roads in the wet season could also minimize the amount of sediment flowing into streams due to the roads.

5. Water Quality

The Oregon Department of Environmental Quality (DEQ) identified a segment of Canyon Creek as having low dissolved oxygen (DO) and decreased streamflow due to water withdrawals and baseflow depletion (DEQ 1988). The impacted beneficial use was irrigation. The 1994, 1996, and draft 1998 DEQ lists identified this segment of Canyon Creek as having low dissolved oxygen (DO) and decreased streamflow due to water withdrawals and baseflow depletion, based on the 1988 Nonpoint Sources Assessment.

Table 13. Miles of Roads and Streams, Stream Crossings, and Densities in the Canyonville/Canyon Creek WAU.

Drainage **Subwatershed**	Acres	Area in square miles	Road Miles	Road Density (miles per square mile)	Stream Miles	Stream Density (miles per square mile)	Number of Road and Stream Crossing Points	Stream Crossings per stream mile
Bear Gulch	4,763	7.44	36.42	4.89	48.86	6.57	89	1.82
Canyon Pass	2,991	4.67	17.47	3.74	22.14	4.74	24	1.08
Canyonville	1,409	2.20	18.94	8.60	6.89	3.13	17	2.47
Jordan Creek	5,189	8.11	51.02	6.29	35.76	4.41	77	2.15
Lower West Fork	5,309	8.30	31.17	3.76	40.06	4.83	76	1.90
South West Fork	4,517	7.06	34.88	4.94	44.45	6.3	88	1.98
Upper West Fork	5,112	7.99	38.90	4.87	50.46	6.32	112	2.22
Canyon Creek Subwatershed	29,289	45.76	228.80	5.00	248.62	5.43	483	1.94
Packard Gulch	4,652	7.27	47.63	6.55	39.65	5.46	90	2.27
South Umpqua Morgan	2,026	3.17	18.85	5.95	22.85	7.22	53	2.32
Small Creek	3,544	5.54	22.13	4.00	25.91	4.68	27	1.04
Stinger Gulch	4,494	7.02	46.56	6.63	32.27	4.6	88	2.73
Portion of WAU in **Shively-O'Shea Subwatershed**	14,716	22.99	135.17	5.88	120.68	5.25	258	2.14
Canyonville/Canyon Creek WAU	44,004	68.75	363.97	5.29	369.30	5.37	741	2.01

Water quality samples were taken on Canyon Creek and the West Fork of Canyon Creek by the BLM in the summer of 1996. The data are presented in Tables 14 and 15. These samples were taken to assess

the general water quality of summer baseflows. No water quality concerns were found with this limited data.

There are approximately 2.5 cfs of water allocations appropriated for Canyon Creek and the West Fork of Canyon Creek. Tables 14 and 15 show this is more than the flow measured when the two water quality samples were taken in August 1996. This would seem to confirm the DEQ data that there are decreased streamflows due to water withdrawals.

Table 14. Water Quality Data for the West Fork of Canyon Creek[1].

Flow (cfs)	Specific Cond. (*u*S/cm)	pH	Alkalinity (mg/L)	Temperature (EC)	Barometric pressure (mm)	DO (mg/L)	$N\text{-}NO_2$ (mg/L)	$N\text{-}NO_3$ (mg/L)	F (mg/L)	Cl (mg/L)
2.02	148	8.1	62	14.0	739	8.8	<.01	0.03	<0.2	3.0
Br (mg/L)	**$P\text{-}PO_4$ (mg/L)**	**SO_4 (mg/L)**	**Li (mg/L)**	**Na (mg/L)**	**$N\text{-}NH_3$ (mg/L)**	**K (mg/L)**	**Mg (mg/L)**	**Ca (mg/L)**	**Sr (mg/L)**	**Ba (mg/L)**
0.6	<0.2	11.7	<0.5	5.1	<.05	0.1	3.5	2.5	<1.0	<0.5

1. Sample taken in T31S, R5W, Section 14 on 8/21/96 at 10 a.m.

Table 15. Water Quality Data for Canyon Creek[1].

Flow (cfs)	Specific Cond. (*u*S/cm)	pH	Alkalinity (mg/L)	Temperature (EC)	Barometric pressure (mm)	DO (mg/L)	$N\text{-}NO_2$ (mg/L)	$N\text{-}NO_3$ (mg/L)	F (mg/L)	Cl (mg/L)
0.07	158	7.6	63	14.0	738	8.3	<.01	0.06	<0.2	2.8
Br (mg/L)	**$P\text{-}PO_4$ (mg/L)**	**SO_4 (mg/L)**	**Li (mg/L)**	**Na (mg/L)**	**$N\text{-}NH_3$ (mg/L)**	**K (mg/L)**	**Mg (mg/L)**	**Ca (mg/L)**	**Sr (mg/L)**	**Ba (mg/L)**
0.6	<0.2	18.9	<0.5	5.8	<.05	0.8	0.8	2.5	<1.0	<0.5

1. Sample taken in T31S, R5W, Section 13 on 8/21/96 at 11 a.m.

Table 16 shows water quality data for the South Umpqua River from the Draft 1998 303(d) List (DEQ 1998). The 303(d) list is a requirement of the 1972 Federal Clean Water Act (CWA) for states to identify those waters which do not meet the state's water quality standards. Waters listed in the 303(d) list must use all existing and readily available water quality data, including at a minimum, waters identified in the State's Water Quality Status Assessment 305(b) Report, waters for which dilution calculations or predictive models indicate nonattainment of standards, water quality problems reported by other agencies, institutions, or the public, and waters identified as impaired or threatened in the State's nonpoint assessments submitted to the Environmental Protection Agency (EPA) under Section 319 of the CWA (DEQ 1996).

Forest fertilization can impact water quality by increasing nitrogen levels in streams. Studies have measured less than 0.5% of the total nitrogen applied reached streams with adequate buffer strips, whereas 2 to 3% of the applied nitrogen was measured in streams with inadequate or no buffers (Moore 1974).

Table 16. Water Quality Limited Parameters of the South Umpqua River from Roberts Creek to Days Creek.

Parameter	Listing Criteria	Season	Beneficial Uses Affected
Aquatic weeds or algae	Periphyton	Summer	Water contact recreation, aesthetics, fishing
Bacteria	1996 Standard for fecal coliform	Year round	Water contact recreation
Biological Criteria			Resident fish and aquatic life
Dissolved Oxygen (DO)	Cool-water aquatic resources: DO < 6.5 mg/l	May 1 - October 31	Resident fish and aquatic life, salmonid spawning and rearing
Habitat Modification	Needs data		Resident fish and aquatic life, salmonid spawning and rearing
pH	6.5 < pH > 8.5	Summer	Resident fish and aquatic life, water contact recreation
Sedimentation	Needs data		Resident fish and aquatic life, salmonid spawning and rearing
Temperature	> 64 EF	Summer	Resident fish and aquatic life, salmonid spawning and rearing

Increased nitrogen levels may increase primary productivity, which may raise the pH level. Peak nitrogen concentrations coinciding with optimal growing conditions for aquatic organisms would have the greatest effect (Fredriksen et al. 1974). However, maximum nitrogen concentrations have been measured in the winter, when the water was cold and photosynthesis was minimal (Fredriksen et al. 1974).

Tables 14 and 15 show nitrate levels found in the Canyon Creek Subwatershed were very low. The U.S. Public Health Service has established 10 mg/L of nitrite-nitrate nitrogen (N) as the maximum level in drinking water. The nitrate levels found in the Canyon Creek Subwatershed were well below the maximum level of nitrates allowed in drinking water.

E. Species and Habitats

1. Fisheries

a. Historic Fish Use in the South Umpqua River Basin

The South Umpqua River historically supported healthy populations of resident and anadromous salmonid fish. A survey conducted in 1937 by the Umpqua National Forest reported that salmon, steelhead, and cutthroat trout were abundant throughout many reaches of the river and its tributaries (Roth 1937). Excellent fishing opportunities for resident trout and anadromous salmon and trout historically existed within the South Umpqua River (Roth 1937). The historical condition of the riparian zone along the South Umpqua River favored conditions typical of old-growth forests found in the Pacific Northwest. Roth noted the shade component that existed along the reaches of streams surveyed. The majority of the stream reaches surveyed were "arboreal" in nature, meaning "tall timber along the banks, shading most of the stream" (Roth 1937). The river and its tributaries were well shaded by the canopy closure associated with mature trees. Streambanks were provided protection by the massive root systems of these trees.

Since 1937, many changes have occurred within the South Umpqua River Basin and in the stream reaches surveyed by Roth. A comparative study conducted by the Umpqua National Forest during the summer low-flow periods between 1989 and 1993 surveyed the same stream reaches in the 1937 report. The results of the study showed 22 of the 31 stream reaches surveyed were significantly different from the 1937 survey (Dose and Roper 1994). Nineteen stream reaches became significantly wider while the remaining three stream reaches were significantly narrower. Of the eight streams surveyed within designated wilderness areas, only one stream channel increased in width since 1937. In contrast, 13 of the 14 stream reaches located in timber harvest emphasis areas were significantly wider than in 1937.

The stream widening could have resulted from increased peak flows. Peak flows typically occur due to the removal of vegetation (tree canopy) and the increase in compacted areas within a watershed, especially within the Transient Snow Zone (Meehan 1991). Peak flows can introduce sediment into the channel from upslope and upstream and can also simplify the channel by rearranging instream structure. Excessive sediment delivery to streams usually changes stream channel characteristics and channel configuration. These stream channel changes normally result in decreasing the depth and the number of pool habitats and reducing the space available for rearing fish (Meehan 1991).

Winter steelhead and resident rainbow trout (Oncorhynchus mykiss), fall and spring chinook salmon (Oncorhynchus tshawytscha), coho salmon (Oncorhynchus kisutch), and sea-run cutthroat and resident cutthroat trout (Oncorhynchus clarki) have been documented using the Canyonville/Canyon Creek WAU. Over the last 150 years, salmonids have had to survive dramatic changes in the environment where they evolved. The character of streams and rivers in the Pacific Northwest has been altered through European settlement, by urban and industrial development, and by land management practices. Modifications in the

landscape and waters of the South Umpqua River Basin, beginning with the first settlers, have made the South Umpqua River less habitable for salmonid species (Nehlsen 1994).

Results from the recent United States Forest Service (USFS) study document changes in low-flow channel widths within the South Umpqua River Basin since 1937 (Dose and Roper 1994). Land management activities (road construction and timber harvesting) have contributed to the changes in channel characteristics. These changes in channel condition may have resulted in the observed decline of three of the four anadromous salmonid stocks occurring in the South Umpqua River Basin (Dose and Roper 1994).

The South Umpqua River once supported abundant populations of chinook and coho salmon, and steelhead and cutthroat trout. These species survived in spite of the naturally low streamflows and warm water temperatures that occurred historically within this Subbasin (Nehlsen 1994). Currently, salmonid populations throughout the Pacific Northwest are declining. A 1991 status report identified a total of 214 native, naturally spawning stocks in the Pacific Northwest as vulnerable and at-risk of extinction (Nehlsen et al. 1991). According to this 1991 report, within the South Umpqua River, one salmonid stock is considered extinct, two stocks of salmonids are at-risk of extinction, and two stocks were not considered at-risk.

Historically steelhead runs in the South Umpqua River were strongest in the winter (Roth 1937). Currently, winter steelhead are considered to be the most abundant anadromous salmonid in the South Umpqua River (Nehlsen 1994). In 1937, Roth reported summer steelhead above the South Umpqua Falls. Summer steelhead are now considered to be extinct (Nehlsen et al. 1991).

Roth (1937) reported the principal run of chinook was in the late spring and summer. Presently, spring chinook runs are considered to be depressed by the Oregon Department of Fish and Wildlife (ODFW). Nehlsen et al. (1991) reported the spring chinook run at high risk of extinction. Fall chinook are considered to be healthy by ODFW (Nehlsen 1994).

Coho salmon were considered abundant in the South Umpqua River Basin in 1972 by the Oregon State Game Commission (Lauman et al. 1972). An estimated 4,000 fish spawned in the basin with the largest number of fish (1,450) spawning within Cow Creek. Presently, coho salmon in the South Umpqua River Basin are suffering the same declines as other coastal stocks. These declines may be due to several factors, including the degradation of their habitat, the effects of extensive hatchery releases, and overfishing (Nehlsen 1994). No coho salmon were sampled within the survey area (i.e., upper stream reaches of the South Umpqua River) during the 1937 survey. A subsequent study conducted during the summer of 1989 in Jackson Creek, a major tributary to the South Umpqua River, documented the common presence of coho salmon within this tributary (Roper et al. 1994). The documentation of coho salmon using Jackson Creek qualifies this species existence in the upper reaches of the South Umpqua River Basin. Coho salmon have been observed and sampled within the Canyonville/Canyon Creek WAU as well.

Sea-run cutthroat are assumed to be depressed from historic levels. The information provided in the 1937 Roth report noted cutthroat trout were common and/or abundant throughout the stream reaches surveyed

in the upper South Umpqua River Basin. There are limited historical records on cutthroat population size within the South Umpqua River.

The assumption that sea-run cutthroat trout abundance is currently below historic levels throughout the Umpqua Basin has been based upon the information provided by the fish counting station at Winchester Dam on the North Umpqua River. Between the years of 1947 and 1957 the North Umpqua River boasted runs of sea-run cutthroat trout averaging approximately 900 fish per year. The highest number return of 1,800 fish occurred in 1954 and the lowest return for the ten year period was 450 fish in 1949. In the late 1950s the sea-run cutthroat trout returns declined drastically.

The stocking of Alsea River cutthroat trout into the Umpqua system began in 1961 and was continued until the late 1970s. The stocking of this genetically distinct stock of trout into the Umpqua system has apparently led to compounding the problem for the sea-run cutthroat trout native to the Umpqua River Basin. Sea-run cutthroat trout returns have been extremely low since discontinuing the hatchery releases in the late 1970s. The levels of returns resemble prehatchery release conditions of the late 1950s, with an average return of less than 100 fish per year (ODFW 1994 - overhead packet). In the 1992-1993 run, no sea-run cutthroat returned to the North Umpqua River. In subsequent years, sea-run cutthroat trout numbers have been a total of 29 fish in the 1993-1994 run, 1 fish in the 1994-1995 run, 79 fish in the 1995-1996 run, 81 fish in the 1996-1997 run, and 91 fish in the 1997-1998 run.

According to the available data, the South Umpqua River appears to have supported a larger run of sea-run cutthroat trout than the North Umpqua River. In 1972, a total of 10,000 sea-run cutthroat trout were estimated within the South Umpqua River Basin. Sea-run cutthroat trout populations seemed to have the highest occurrence in those streams occupied by and accessible to coho salmon (Lauman et al. 1972). Today, these fish are limited to the upper portion of the mainstem South Umpqua River and Cow Creek, one of the major tributaries to the South Umpqua River. Warm water temperatures, lack of over-summering pool habitats, and low flows have precluded their use of the lower stream reaches in the basin (Nehlsen 1994).

b. Current Stream Habitat Conditions

The Umpqua Basin cutthroat trout has been listed by the National Marine Fisheries Service (NMFS) as an endangered species under the Endangered Species Act (ESA) of 1973, as amended. The Oregon Coast coho salmon was a proposed species. The National Marine Fisheries Service determined the Oregon Coast coho salmon Evolutionary Significant Unit did not warrant listing but may consider the Oregon Coast coho salmon to be a candidate species in 3 years (or earlier if warranted by new information) (Federal Register, Vol. 62, No. 87/Tuesday, May 6, 1997/Rules and Regulations). The West Coast steelhead has been proposed for listing by NMFS as a threatened species under the ESA. Two fish species, the Pacific lamprey (Lampetra tridentata) and the Umpqua chub (Oregonichthys kalawatseti) are on the United States Fish and Wildlife Service (USFWS) list as Species of Concern and are considered Bureau Sensitive species by the BLM (Manual 6840). All these species have been documented within the South Umpqua River.

Fish distribution limits have been mapped, using GIS, for streams with documented barriers within the Canyonville/Canyon Creek WAU (see Map 14). Distribution limits of anadromous and resident fish are determined by the extent these fish are able to migrate upstream. Natural waterfalls, log or debris jams, beaver dams, and road crossings are potential barriers to fish movement and migration. Fish barriers are shown on Map 14.

Aquatic habitat inventories have been completed for the mainstems of three streams in this WAU. The aquatic habitat inventory covers about 23 miles of the approximate 369 total stream miles within the Canyonville/Canyon Creek WAU (see Table C-1 in Appendix C). The inventories are used to describe the current condition of the aquatic habitat with a focus on the fish-bearing stream reaches within a watershed.

The aquatic habitat inventory is not a fish distribution or fish abundance survey. The habitat inventory is designed only to survey physical habitat features. However, fish use and distribution information was noted in the habitat inventories. The stream surveyors noted fish use by visual observation only. The information available on the habitat condition and the distribution of fish species in the streams that have not been surveyed is in the form of personal communications and observations by ODFW and BLM biologists.

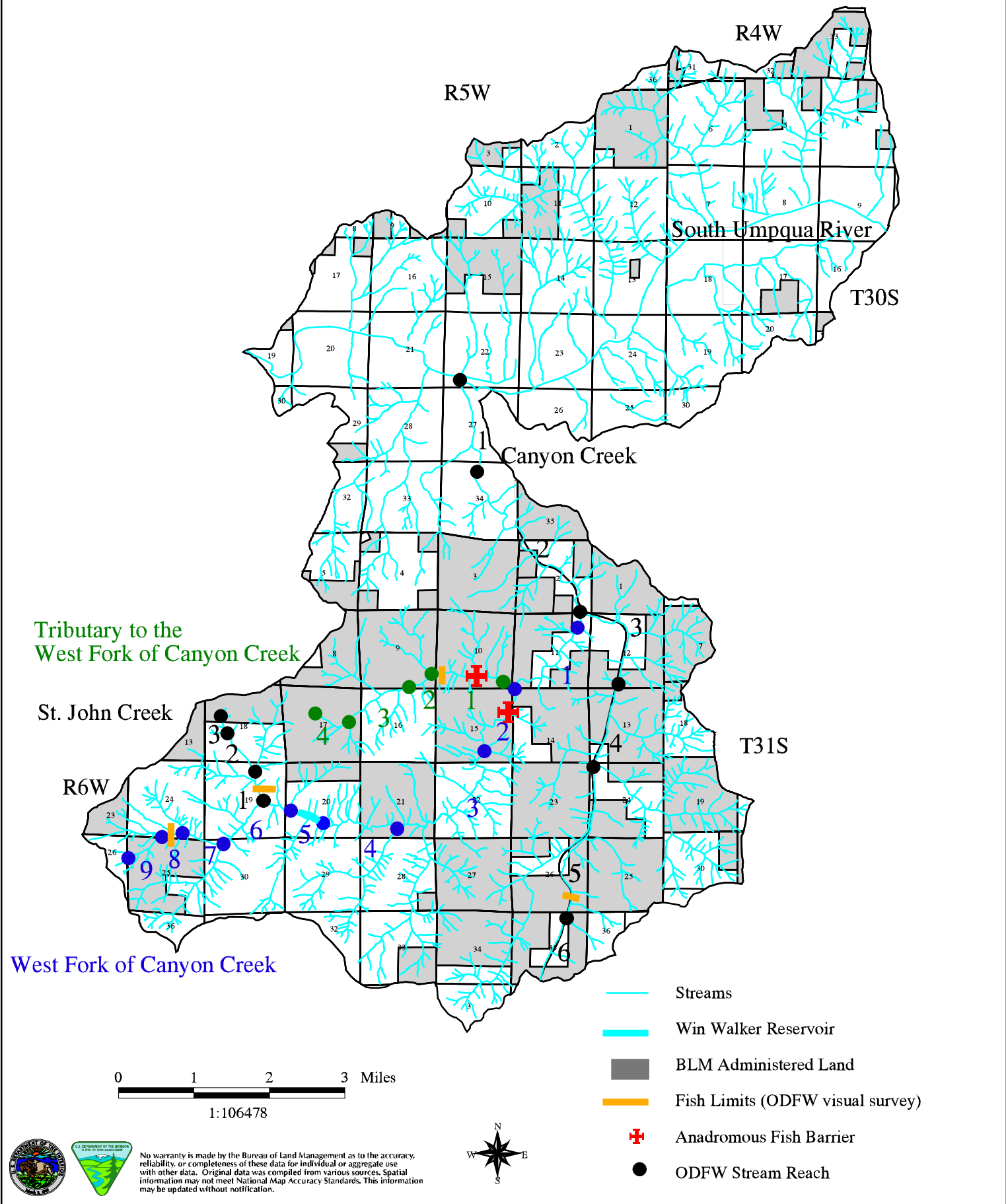
The data collected through the ODFW Aquatic Habitat Inventory can be used to analyze the components that may limit the aquatic habitat and the fishery resource from reaching their optimal functioning condition. The Habitat Benchmark Rating System is a method developed by the Umpqua Basin Biological Assessment Team (BAT team) to rank aquatic habitat conditions (see Appendix C). The BAT team consists of fisheries biologists from the Southwest Regional Office of the ODFW, Coos Bay District BLM, Roseburg District BLM, Umpqua National Forest USFS, and Pacific Power and Light Company. The intention of the matrix designed by the BAT team is to provide a framework to easily and meaningfully categorize habitat condition. This matrix is not intended to reflect equality of the habitat condition of each stream reach, but is intended to summarize the overall condition of the surveyed reaches. The matrix is a four category rating system consisting of an *Excellent*, *Good*, *Fair*, or *Poor* rating.

Data from the 1995 ODFW Aquatic Habitat Inventories for the Canyonville/Canyon Creek WAU were analyzed to determine an overall aquatic habitat rating (AHR) for each stream. How the ratings correlate to the NMFS Matrix (see Appendix C) are shown in Table 17.

Table 17. Aquatic Habitat Ratings (AHR).

ODFW Aquatic Habitat Inventories	NMFS Matrix
Excellent or Good	Properly Functioning
Fair	At Risk
Poor	Not Properly Functioning

Map 14. Canyonville/Canyon Creek WAU
ODFW Aquatic Habitat Inventory Stream Reaches



Each stream contains different limiting factors. Limiting factors for the fishery resource may include conditions where there has been a reduction in instream habitat structure, an increase in sedimentation, the absence of a functional riparian area, a decrease in water quantity or quality, or the improper placement of drainage and erosion control devices associated with the forest road network.

Twenty-two stream reaches were identified in the Aquatic Habitat Inventories. Two stream reaches were rated as being in good condition, sixteen reaches rated as being in fair condition, four stream reaches were rated as being in poor condition, and no stream reaches were rated excellent (see Table C-1 in Appendix C). Fifteen of the twenty-two stream reaches were determined to be fish-bearing (by visual observation). Some of the limiting factors associated with reaches being rated as poor or fair are the lack of Large Woody Debris (LWD), high width to depth ratios (W/D, an indicator of stream channel condition), relatively high sediment loads in the riffle habitats, and hardwood dominated riparian vegetation.

Canyon Creek

The mainstem of Canyon Creek contains approximately 5.7 miles of anadromous fish habitat. The BLM administers approximately 0.5 mile of the anadromous fish habitat and approximately 2.0 miles of resident fish habitat on the mainstem of Canyon Creek (see Map 14).

West Fork of Canyon Creek

The West Fork of Canyon Creek contains approximately 2.1 miles of anadromous fish habitat. The BLM administers approximately 0.5 mile of the anadromous fish habitat and approximately 2.0 miles of resident fish habitat (see Map 14).

Reach #5 on the West Fork of Canyon Creek could not be surveyed since it included Win Walker Reservoir. The stream is dammed by a concrete structure approximately 58 feet in height. The dam is a migration barrier for resident fish. The anadromous fish barrier is a bedrock falls in Reach #2 on the West Fork of Canyon Creek. The falls are located approximately 0.3 miles upstream from the confluence with the Unnamed Tributary to the West Fork of Canyon Creek and approximately 4.4 miles downstream from the reservoir dam (see Map 14).

Unnamed Tributary to the West Fork of Canyon Creek

The Unnamed Tributary to the West Fork of Canyon Creek contains approximately 0.9 mile of anadromous fish habitat and approximately 1.2 miles of resident fish habitat (see Map 14). The BLM administers all of the anadromous and resident fish habitat on this stream.

2. Wildlife

A variety of wildlife species live in the different plant communities present in the WAU. The various vegetation types provide habitat to over 200 vertebrate species and thousands of invertebrate species. Fifty-six animal species are of special concern because they are Federally Threatened (FT), Endangered (FE), Bureau Sensitive (BS), Bureau Assessment species (BA), or Oregon State sensitive species (see Table E-1 in Appendix E). In addition to these species, the Standards and Guidelines in the Record of Decision (ROD) for the Management of Habitat for Late-Successional and Old-Growth Forest Related Species Within the Range of the Northern Spotted Owl (USDA and USDI 1994b), lists animal species to survey and manage (S&M) for in Oregon, Washington, and California (USDA and USDI Appendix J2 1994a).

a. Threatened and Endangered Species

Five terrestrial species known to occur in the Roseburg District are legally listed as Federally Threatened (FT) or Federally Endangered (FE). These include the American Bald Eagle (Haliaeetus leucocephalus) (FT), the Marbled Murrelet (Brachyramphus marmoratus) (FT), the Northern Spotted Owl (Strix occidentalis caurina) (FT), the Peregrine Falcon (Falco peregrinus anatum) (FE), and the Columbian White-tailed Deer (Odecoilus virginianus leucurus) (FE). The northern spotted owl is the only Federally listed threatened or endangered terrestrial species known to occur within the Canyonville/Canyon Creek WAU.

1) The Northern Spotted Owl

The northern spotted owl is found in the Pacific Northwest, from northern California to lower British Columbia in Canada. The geographic range of the northern spotted owl has not changed much from historical boundaries. Nesting habitat historically used by spotted owls has been changed to the point that owl population numbers have declined and distribution rearranged.

Suitable forest habitats where spotted owls have been located are known as spotted owl activity centers or master sites. In the Canyonville/Canyon Creek WAU, there are 14 spotted owl master sites. This number includes current and historically active and inactive master sites. Because owls use different areas during different years, a master site may have alternate sites. All 14 sites are found on BLM administered lands. Due to the presence of alternate sites, it is possible to have only eight active sites at one time. All eight sites were occupied during 1997. Table 18 contains information about the status of use, habitat acres, occupation, and reproduction success of owls in activity centers within the WAU.

Habitat on Federal land important to the spotted owl was identified by Roseburg District BLM biologists based upon on-the-ground knowledge, inventory descriptions of forest stands, and known characteristics of the forest structure. Two habitat types were described and named Habitat 1 (HB1) and Habitat 2 (HB2). Habitat 1 describes forest stands that provide nesting, foraging, and resting components. Habitat 2 describes forest stands that provide foraging and resting components but lack nesting components. Other areas not fitting into the HB1 or HB2 category were named Habitat 3 (HB3) and Habitat 4 (HB4).

Table 18. Spotted Owl Activity Center Ranking Data Within the Canyonville/Canyon Creek WAU in the South River Resource Area (1996).

MSNO	Year Site was Located	Last Year of Known Active Pair (Pair Status + # Juveniles)	Last Year Occupied (Pair Status)	Number of Years of Reproduction/Pair Status Since 1985	Suitable Habitat Acres in Provincial Radius (1.3 Miles)	Suitable Habitat Acres in 0.7 Mile Radius	Land Use Allocation	Occupancy Rank	Acres Rank	History Rank
0365	1979	1990(P+1J)	1991(S)	1/1	1,232	525	LSR	1	A	1
0365A	1986	1997(P+0J)	1997(S)	4/6	1,198	556	LSR	1	A	1
0366	1983	1986(P+2J)	1986(P)	2/4	1,178	487	LSR	1	B	1
0366A	1987	1997(P+0J)	1997(P)	0/2	1,043	312	LSR	1	B	1
0366B	1989	1991(P+1J)	1991(P)	1/2	1,121	263	LSR	1	B	1
0366C	1990	1996(P+0J)	1996(P)	0/2	1,003	300	LSR	1	B	1
1982	1986	1997(P+2J)	1997+(P)	4/6	1,064	450	LSR	1	B	1
2091	1989	1996(P+2J)	1997(M+F)	4/7	710	246	CONN	1	D	1
2092	1989	1997(P+0J)	1997(P)	2/4	1,193	427	CONN	1	B	1
2210	1990	1997(P+0J)	1997(P)	4/7	354	209	CONN	1	D	1
2292	1990	1997(P+2J)	1997(P)	5/6	1,036	373	CONN	1	B	1
2292A	1995	1995(P+1J)	1995(P)	1/1	1,227	506	CONN	1	A	1
2292B	1996	1996(P+2J)	1996(P)	1/1	1,273	439	CONN	1	B	1
4365	1990	1997(P+2J)	1997(P)	2/2	1,183	479	CONN	1	B	1

Definitions

OCCUPANCY RANK - 1: Sites with this ranking have current occupancy and have been occupied by a single owl or pair of owls for the last 3 years; 2: Sites with this ranking have been occupied in the past, show sporadic occupancy by a single owl or an owl pair, may be currently occupied; 3: Sites with this ranking have not been occupied during the last 3 years.

LAST YEAR OF KNOWN ACTIVE PAIR - Gives the year, pair status and number of young produced; NP = site has not had a pair; ND = No Data.

ACRES RANK - These acres are in regards to suitable spotted owl habitat. A: These sites have greater than 1,000 acres in the provincial radius and greater than 500 acres within the 0.7 mile radius; B: These sites have greater than 1,000 acres in the provincial radius but less than 500 acres within the 0.7 mile radius; C: These sites have less than 1,000 acres in the provincial radius and greater than 500 acres in the 0.7 mile radius; D: These sites have less than 1,000 acres in the provincial radius and less than 500 acres in the 0.7 mile radius.

HISTORY RANKING - This ranking includes occupancy ranking, reproduction data, acres ranking, habitat evaluation, and field experience about the site (location, quality, and forest structure). 1: A site considered stable due to consistent occupation by spotted owls and has been producing young consistently; 2: Site is consistently used by spotted owls but reproduction is sporadic; 3: Site shows some reproduction, occupation has been sporadic, or no occupation. Pv = Site is located on private land; OR = Site is located on Oregon State Lands.

PAIR STATUS - M = MALE; F = FEMALE; J = JUVENILE; P = PAIR STATUS; (M+F) = TWO ADULT BIRDS, PAIR STATUS UNKNOWN; PU = PAIR STATUS UNDETERMINED; S = SINGLE OWL; ND = INCOMPLETE OR NO DATA.

NUMBER OF YEARS OF REPRODUCTION/PAIR STATUS SINCE 1985 - The first number gives the number of years with spotted owl reproduction at this site since 1985. The second number gives the number of years for the entire history of the activity center since 1985 (including the original and alternate sites, i.e. 1090A). ND = No Data.

Habitat 3 refers to forest stands that have the potential to develop into suitable Habitat 2. Habitat 4 refers to areas that would not develop into suitable habitat in the foreseeable future. Tables 19 and 20 give the acres of each habitat type present in the Canyonville/Canyon Creek WAU. Map 15 shows the distribution of Habitats 1, 2, and 3 within the WAU. The Canyonville/Canyon Creek WAU has 6,208 acres of Habitat 3, which may develop into suitable habitat for the spotted owl.

Table 19. Acres and Percentages of Spotted Owl Suitable Habitat Types Within the Canyonville/Canyon Creek WAU.**

Species	Habitat 1	Habitat 2	Habitat 3	Habitat 4	TOTAL
Spotted Owl	1,603 acres	6,692 acres	6,208 acres	572 acres	15,075 acres
	10.6%	44.4%	41.2%	3.8%	100%

** See text for definition of Habitat 1 and 2.

Table 20. Number of Acres and Percent of the Canyonville/Canyon Creek WAU in Habitat 1 and 2 (Federal Land Only).

Habitat 1	Habitat 2	Total Federal Land	Total Area in Canyonville/Canyon Creek WAU
1,603 acres	6,692 acres	16,337 acres	44,004 acres
9.8%	41.0%	37.1%	100%

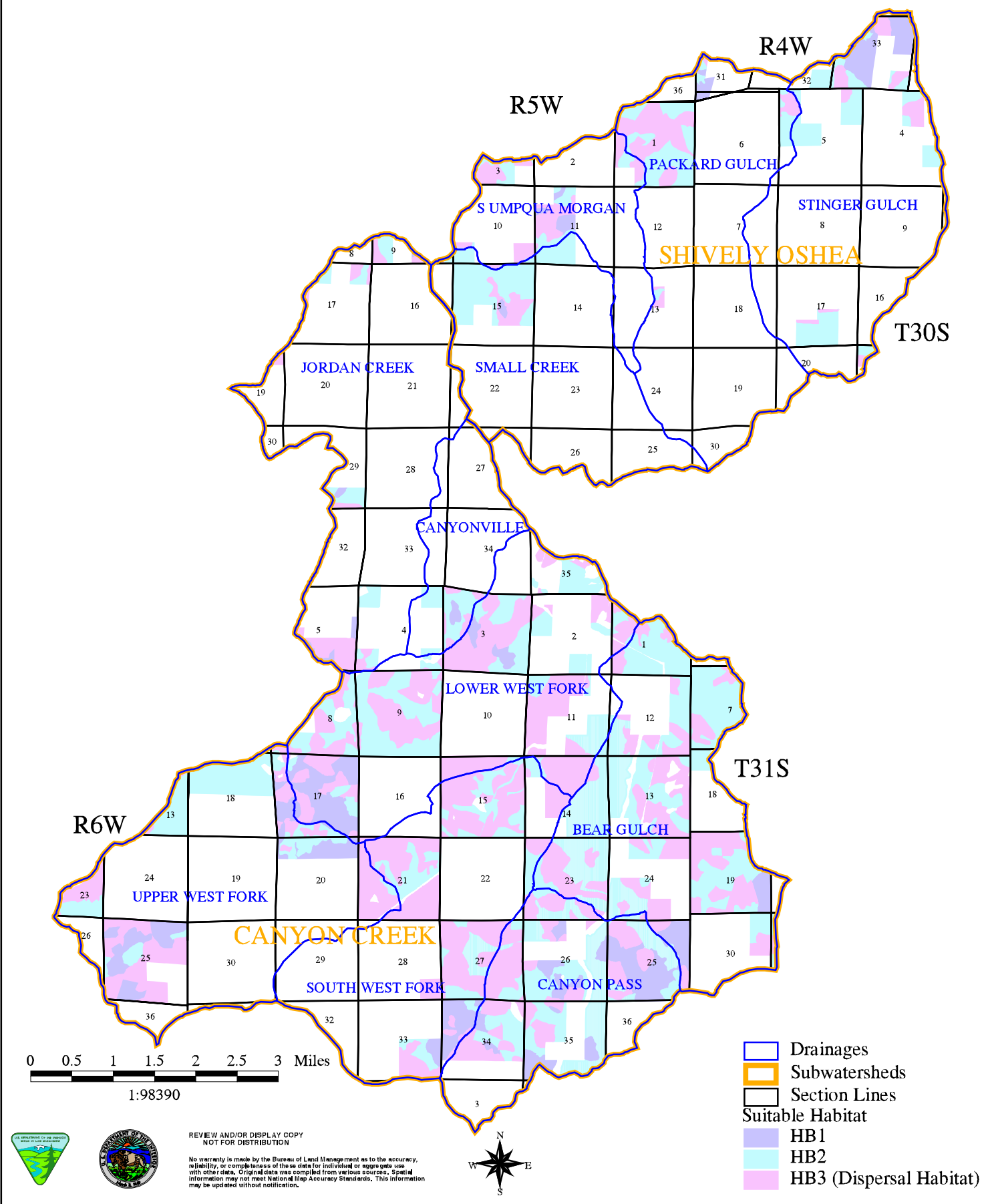
a) Dispersal Habitat

Dispersal habitat refers to forest stands greater than 40 years old that provide cover, roosting, foraging and dispersal components spotted owls use while moving from one area to another (Thomas et al. 1990, USDI 1992a, and USDI 1994b). One method used to quantify dispersal habitat on Federally administered land is the amount of 50-11-40 acres. This number (50-11-40) refers to the condition where 50% of forested stands within one quarter township are composed of 11 inch diameter trees with a minimum of 40% canopy closure (Thomas et al. 1990). This habitat condition is important as dispersal habitat outside of late-successional stands. Other animal species may also use this dispersal habitat while moving from one area to another. There are approximately 5,767 acres of dispersal habitat in the Canyonville/Canyon Creek WAU.

b) Critical Habitat for the Recovery of the Northern Spotted Owl

The Canyonville/Canyon Creek WAU boundary overlaps two critical habitat units designated by the United States Fish and Wildlife Service (USDI 1992b). They are Critical Habitat Units CHU-OR-63 and CHU-OR-32 (see Map 16). On Federally administered lands, there are approximately 8,544 acres in CHU-OR-63 and 69,731 acres in CHU-OR-32. Approximately 22% of CHU-OR-63 is inside the

Map 15. Suitable and Dispersal Habitat Within the Canyonville/Canyon Creek WAU



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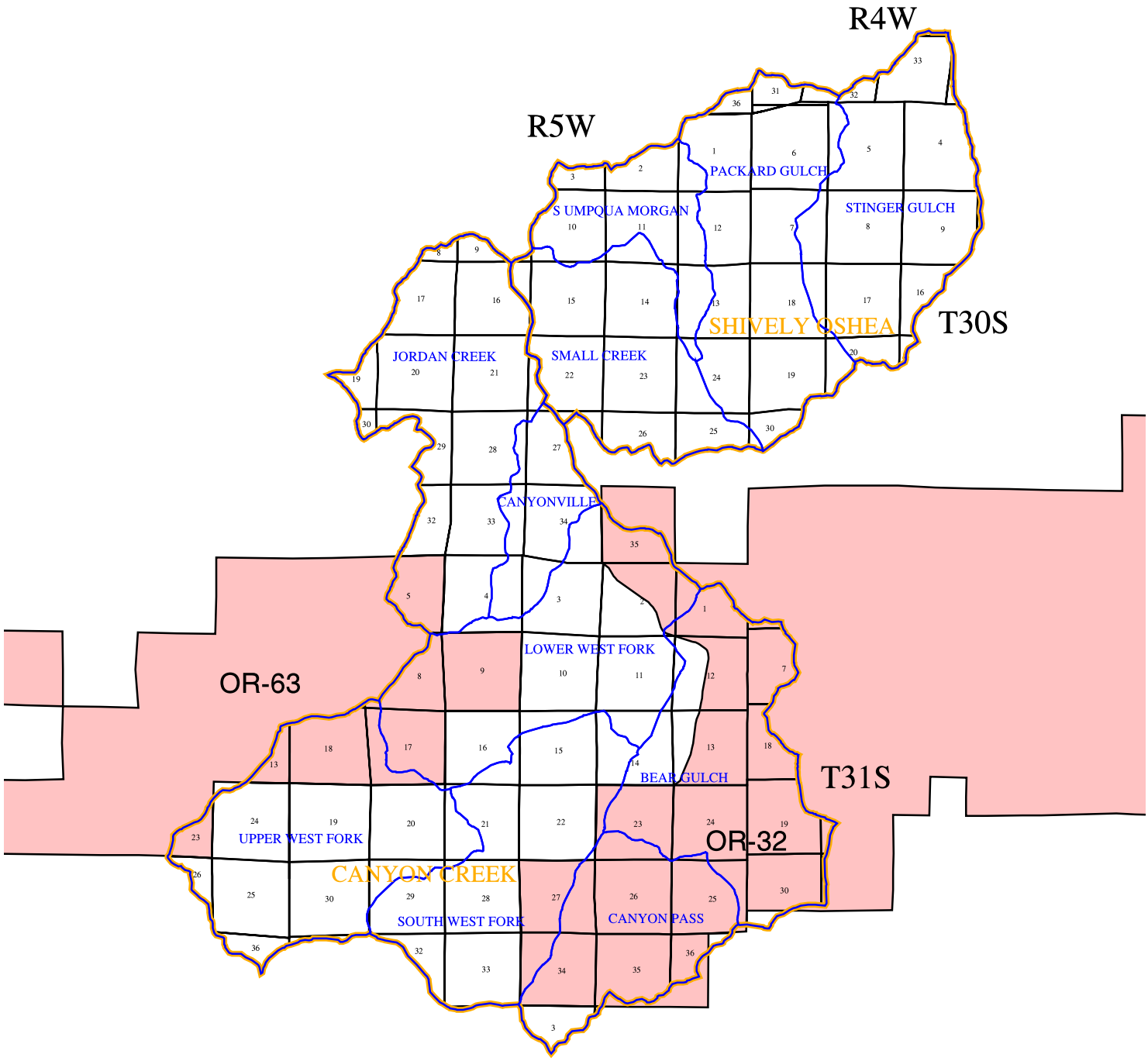
Map 16. Spotted Owl Critical Habitat Units in the Canyonville/Canyon Creek WAU



0 1 2 3 4 Miles

1:125227

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N W E S

- Drainages
- Subwatersheds
- Section Lines
- Spotted Owl Critical Habitat Units (CHU)

Canyonville/Canyon Creek WAU and about 9% of CHU-OR-32 is inside the WAU boundary. The portion of the Canyonville/Canyon Creek WAU overlapping CHU-OR-63 has 1,366 acres of suitable spotted owl habitat (HB1 and HB2). The area overlapping with CHU-OR-32 has 3,420 acres of suitable habitat. Critical Habitat Unit OR-63 contains 937 acres of HB3 and CHU-OR-32 contains 2,193 acres.

2) The American Bald Eagle

Historic distribution of the bald eagle included the entire northwestern portion of the United States (California, Oregon, and Washington), Alaska, and western Canada. Bald eagle populations probably started declining in the 19th century but did not become noticeable until the 1940s (USDI 1986).

Throughout the North American range, drastic declines in bald eagle numbers and reproduction occurred between 1947 and the 1970s. In many places, the bald eagle disappeared from the known breeding range. The reason for this decline was the impact organochloride pesticide (DDT) use had on the quality of egg shells produced by bald eagles (USDI 1986). Bald eagle numbers probably declined on the Roseburg BLM District because DDT was used in western Oregon from 1945 to the 1970s (Henny 1991). Other causes of bald eagle decline included shooting and habitat deterioration (Anthony et al. 1983). Historically, removal of old-growth forests near major water systems (e.g., North and South Umpqua Rivers) contributed to habitat deterioration through the loss of bald eagle nesting, feeding, and roosting habitat.

Information collected from yearly inventories (1971 to 1995) by Isaacs and Anthony (1995) of known bald eagle sites in Douglas County does not list any sites, nests, or territories within or near the Canyonville/Canyon Creek WAU. Stand characteristics such as large, dominant trees with large limbs and broken tops and close to water, often used by eagles for nesting, are present in some of the forest stands within one mile of the South Umpqua River. Approximately 40 acres are greater than 200 years old and may contain habitat characteristics used for nesting by bald eagles. Midwinter surveys, from Days Creek to Melrose, have not detected bald eagles in the Canyonville/Canyon Creek WAU (Isaacs 1995). On occasion, bald eagles are observed during the winter near the South Umpqua River but the eagles do not stay and do not appear to use the area as a long term wintering ground. To date there is no evidence of nesting by bald eagles in the WAU.

3) The Peregrine Falcon

In Oregon, peregrine falcons were a "common breeding resident" along the Pacific coastline and were present in many areas including southwestern Oregon (Haight 1991). Peregrine falcon populations in the Pacific Northwest declined because of organochloride pesticide use, shooting, other chemicals (avicides, such as organophosphates) used to kill other bird species considered pests, and habitat disturbance (loss of wetlands, loss of fresh water marsh environments in interior valleys, and increased rural development) (Aulman 1991).

Several areas in the Canyonville/Canyon Creek WAU are at higher elevations and have exposed bedrock due to erosion and other geological processes. However, an evaluation using aerial photographs and on-the-ground reviews determined the WAU lacks (in the areas that have been field reviewed) the typical cliff habitats or large rock outcrops usually associated with suitable nesting habitat used by peregrine falcons.

4) The Marbled Murrelet

The marbled murrelet was listed as a threatened species in 1992 (USDI 1992c). Critical habitat for the recovery of the marbled murrelet was designated in 1996 (Federal Register 61(102):26256-26278). The marbled murrelet is found in the Roseburg BLM District but all of the Canyonville/Canyon Creek WAU is outside of the 50 miles zone where the marbled murrelet would be expected to be found.

5) The Columbian White-tailed Deer

The Columbian white-tailed deer is not expected to occur in the Canyonville/Canyon Creek WAU. The WAU is outside the current and historical distribution range of the Columbian white-tailed deer (USDI 1983). The known white-tailed deer population is restricted to an area northeast of Roseburg, approximately 15 to 20 air miles from the northern boundary of the WAU (USDI 1983 and USDI 1995).

b. Remaining Species of Concern

Animal species not threatened or endangered, may belong to the Federal Candidate, Bureau Sensitive, Bureau Assessment, or Survey and Manage category. On the Roseburg BLM District 23 are Bureau Sensitive and 14 are Bureau Assessment species. Table E-1 in Appendix E lists the species expected to occur in the Canyonville/Canyon Creek WAU.

Although there is information about the biology and habitat requirements of the Bureau Sensitive and Bureau Assessment species, population levels and current distribution are not available. Many of these animals use unique features such as ponds, seeps, caves, or talus found throughout the landscape and associated vegetation cover. In the Canyonville/Canyon Creek WAU, the forest inventory of age classes is available, but the distribution patterns and abundance of unique habitats are not available at this time.

1) The Great Gray Owl

The great gray owl is not common in the South River Resource Area but there have been documented observations. This species has not been observation to occur in the WAU. Generally, this species is found at higher elevations, nesting in forest stands near or adjacent to natural or managed openings. The Northwest Forest Plan (USDA and USDI 1994) designated this species as a Protection Buffer species. There are approximately 510 acres of potential great gray owl habitat at or above 3,000 feet in elevation on BLM administered land in the WAU (see Map 17).

2) Mollusks

In western Oregon and Washington, over 150 species of land snails and slugs have been identified. Mollusks can be found at any elevation and in a variety of habitat types. Generally, snails and slugs avoid disturbed areas where habitat modification leads to loss of moisture and increased exposure to solar radiation (Frest and Johannes 1993).

Managing for late seral characteristics tends to increase the moisture retention of an area. Increased tree species diversity (especially hardwood species), down woody debris amounts, and soil depth in late seral stands produce a more favorable moisture regime at a given site and increases the abundance and diversity of mollusks present. Mollusk abundance increases the available nutrients at a site, increasing growth rates and moisture retention.

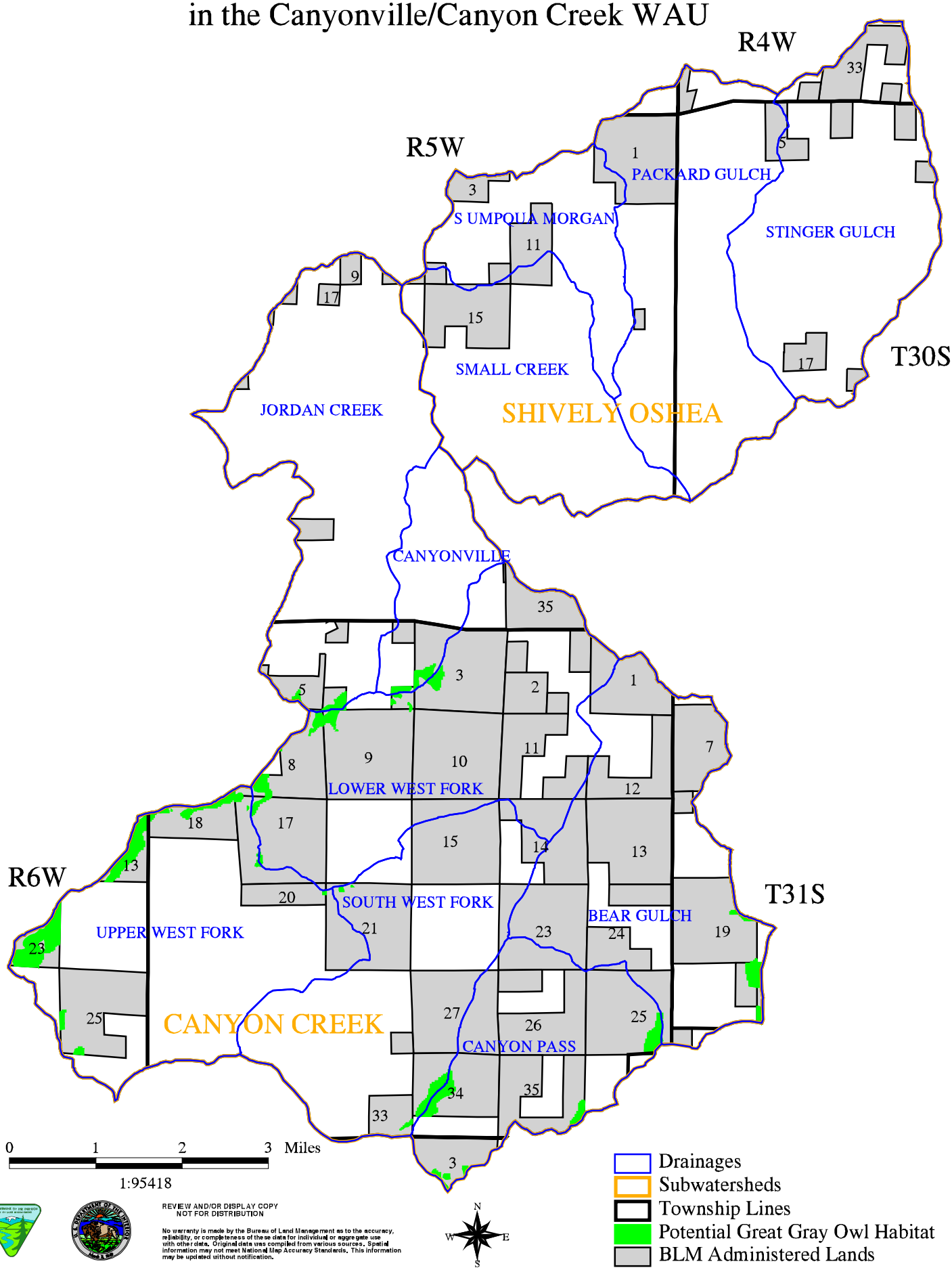
Over 200 species of aquatic mollusks have been documented in western North America. These species inhabit permanent or seasonal water bodies. Most freshwater mollusks prefer cold and clear streams with dissolved oxygen (DO) near saturation levels (Frest and Johannes 1993). In 1993, Frest and Johannes stated that 108 mollusk species (57 freshwater aquatic and 51 land) are known in the range of the spotted owl. Of these, 102 species are known or are likely to occur on Federally administered lands.

In 1997, Frest and Johannes reported 46 mollusk species (17 land and 29 aquatic species) were known to occur in Douglas County. An additional 75 species may be present. Thirty-one of these species were analyzed in the SEIS ROD as sensitive taxons. Only four species of land snails and slugs present in Douglas County are listed in Table C-3 of the SEIS ROD as requiring surveys prior to ground disturbing activities.

The current distribution of mollusks reflects the progressive fragmentation of historically more uniform habitat and widespread ranges due to human alteration of forested environments. Six mollusk survey plots were located in the Canyonville/Canyon Creek WAU in 1997. Several species were common on most plots, including Ancotrema sportella, Haplotrema vancouverense, and undescribed species of Vespericola and Monadenia. One Survey and Manage mollusk species, Prophysaon coeruluem, the blue-grey taildropper slug, was identified on one plot in T30S, R4W, Section 8. The preferred habitat elements for the blue-grey taildropper slug are canopy closure greater than 70%, hardwoods and deep leaf litter, down logs and ground vegetation such as sword fern and salal.

One Survey and Manage species thought to be present in the southern portion of the Roseburg BLM District is Helminthoglypta hertleini, a medium-sized land snail frequently found in rocky talus habitats. The habitat type and range is similar to that of the Del Norte salamander, which is also a Survey and Manage species. Surveys for these two species could be conducted simultaneously. No sites of Helminthoglypta hertleini had been found on the Roseburg BLM District, as of March 1998.

Map 17. Potential Great Gray Owl Habitat in the Canyonville/Canyon Creek WAU



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3) Amphibians

An inventory of amphibians in the South River Resource Area was completed in 1994 (Bury 1995). Another inventory was conducted in 1997. These inventories document amphibian species in the area. The spotted frog is not expected to occur in the Canyonville/Canyon Creek WAU and was not found during the 1994 inventory. Species like the Southern Torrent salamander (Rhyacotriton variegatus), western red-backed salamander (Plethodon vehiculum), Dunn's salamander (Plethodon dunni), and other regional species were documented in the WAU.

Amphibian species such as the northern red-legged frog, foothill yellow-legged frog, and clouded salamander use unique habitats often found within many vegetation types. Features like large down woody material, talus slopes, creeks, seeps, ponds, and wetlands are often used by amphibian species in southwestern Oregon. Because these features are found in the Canyonville/Canyon Creek WAU, these amphibian species are expected to occur here.

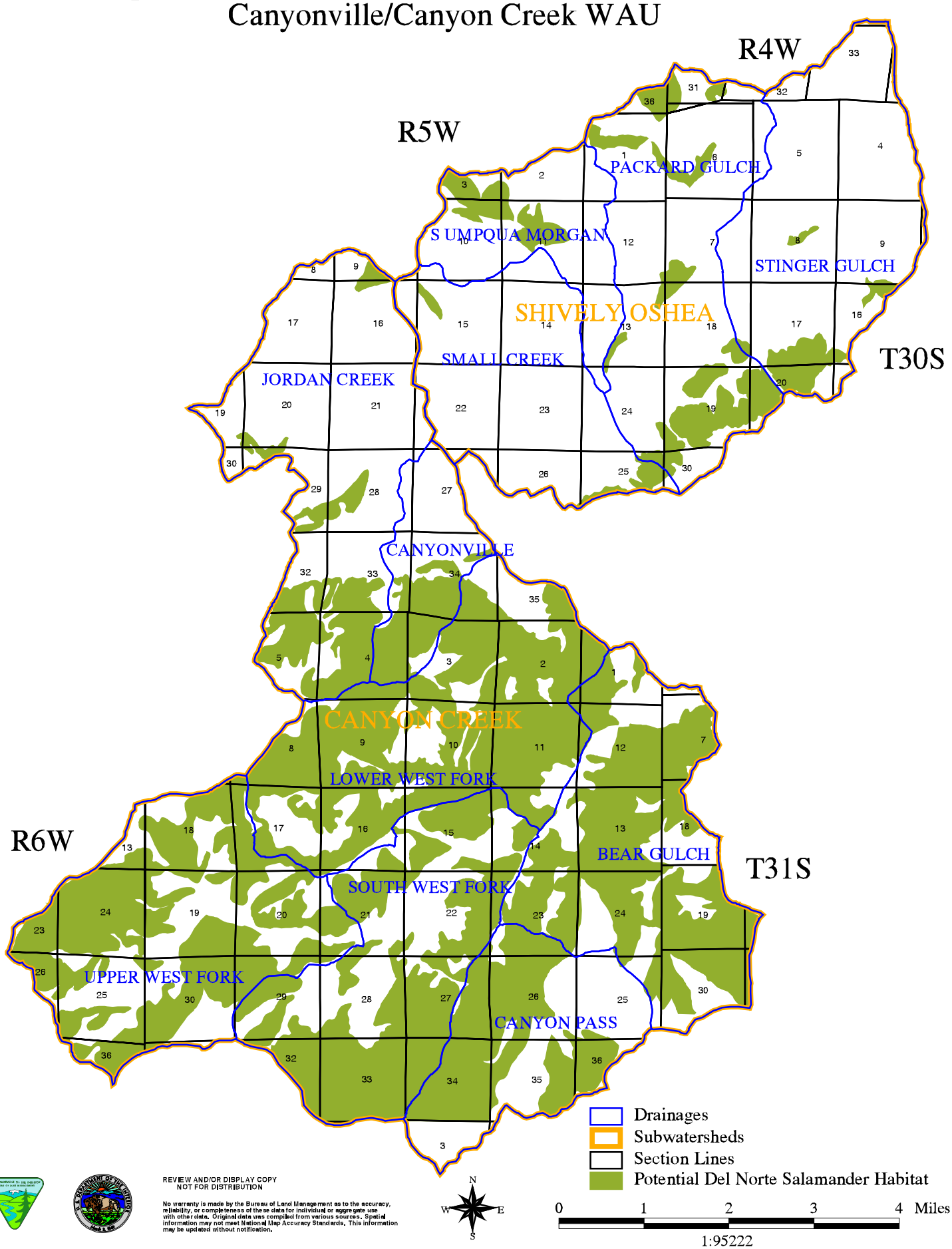
The Del Norte salamander (Plethodon elongatus), a Survey and Manage species, was located north of the Medford BLM District line near Union Creek in the Cow Creek Watershed in 1997. This is the first and farthest north known Del Norte salamander site located in the South River Resource Area and the Roseburg BLM District. The Del Norte salamander was not located within the WAU. The Del Norte salamander uses forested talus habitat, rocky substrates in hardwood forests, and riparian areas. Other habitat features include cool moist conditions with moss and fern ground cover, lichen downfall, deep litter, and cobble dominated rocky substrates (IB-OR-96-161, Protocols for Survey and Manage Amphibians). Ongoing surveys may extend the range of the Del Norte salamander into the Canyonville/Canyon Creek WAU. Surveys for the Del Norte salamander need to be conducted within 25 miles of known sites. The entire Canyonville/Canyon Creek WAU falls within the 25 mile buffer zone, which means surveys for the Del Norte salamander need to be conducted within the WAU.

Evaluation of potential Del Norte salamander habitat in the WAU indicated about 17,152 acres (39%) of the total 44,004 acres in the WAU has some type of talus material (see Map 18). There are 2,090 acres in LSR, 4,135 acres in GFMA, and 2,802 acres in Connectivity/Diversity Blocks. The total potential talus habitat on BLM administered land is 9,027 acres. Approximately 5,033 acres (56%) of the areas with talus material are associated with forests at least 80 years old. This evaluation only gives the potential talus habitat, which may be suitable habitat for the Del Norte salamander and does not mean all areas shown on Map 18 are suitable or occupied habitat.

4) Mammals

During the summer of 1994, a survey to identify the bat species present in the South River Resource Area was conducted by Dr. Steve Cross of Southern Oregon College in Ashland, Oregon. Bat species use unique habitats like caves, talus, cliffs, snags, and tree bark for roosting, hibernating, and maternity sites. In addition, bats use other unique habitats (ponds, creeks, and streams) for food and water. Special status

Map 18. Potential Del Norte Salamander Habitat in the Canyonville/Canyon Creek WAU



bat species are present on the Roseburg BLM District and are expected to occur in the Canyonville/Canyon Creek WAU.

Mammals like the white-footed vole and the red tree vole, which have geographic ranges including the Roseburg BLM District, are expected to be present in the Canyonville/Canyon Creek WAU. Information about the biology and life history of the white-footed vole is limited (Marshall 1991). This species is associated with riparian zones, woody materials, and heavy cover. More recent information suggests the white-footed vole is associated with mature forests (Marshall 1991).

The red tree vole is an arboreal rodent, which lives inside the tree canopy of Douglas-fir forests in Oregon and Northern California. Its primary food is Douglas-fir needles. However, needles from Sitka spruce, western hemlock, and grand fir are also eaten by red tree voles (Huff et al. 1992). In 1997, the South River Resource Area began surveying for red tree voles. The results will not be available until the end of 1998. Reports from evaluating spotted owl pellets indicate the red tree vole is present in the Canyonville/Canyon Creek WAU.

The South Umpqua Watershed (a fifth field watershed) was evaluated to determine the amount of red tree vole habitat available through the year 2000 (using interim guidance BLM-IM-OR-97-009). This evaluation showed approximately 72% of the Federally administered land in the South Umpqua Watershed has a crown closure of 60% and an average tree diameter of 10 inches or greater. Red tree vole surveys would not be conducted on lands meeting the threshold mentioned in the interim guidance.

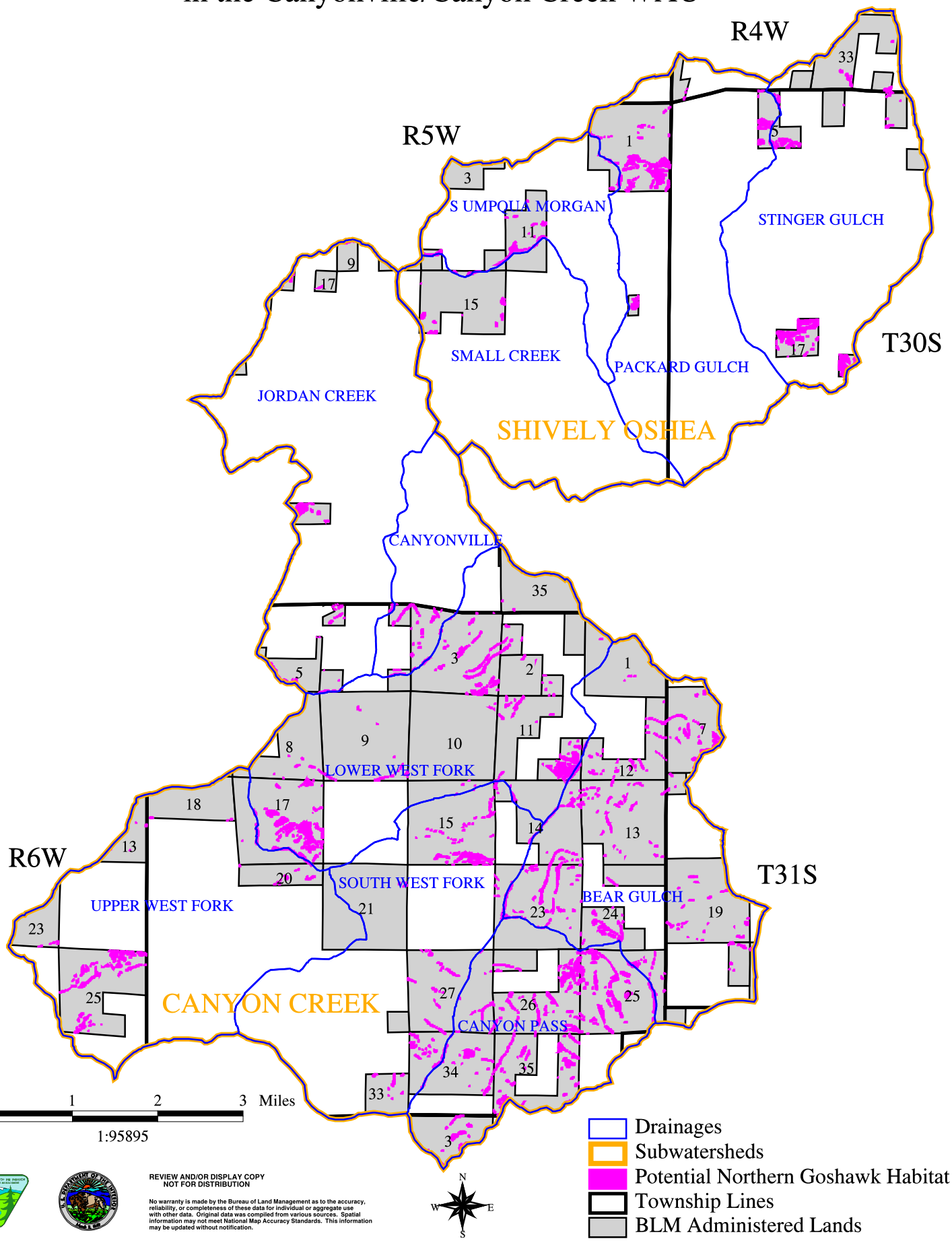
5) Northern Goshawk

Information about the northern goshawk is readily available (Marshall 1991). However, most of the work with this species was done east of the Cascade Mountains. Current geographic distribution suggests that the northern goshawk would not be expected to occur in most of the Roseburg BLM District. Observations recorded since 1984 show the northern goshawk is present north of the expected distribution range. In the early 1980s, two nest sites were found on the Roseburg BLM District but were not located within the Canyonville/Canyon Creek WAU. The Canyonville/Canyon Creek WAU has approximately 10,223 acres of stands at least 80 years old, which could be considered potential northern goshawk habitat. About 661 acres of the potential northern goshawk habitat on BLM administered land have characteristics (i.e. favored slope and aspect), which would increase the probability of northern goshawks using these areas (see Map 19).

6) Other Raptors

The Canyonville/Canyon Creek WAU supports bird of prey species common to the region but estimates of local populations are not available. Raptor species are expected to occur where suitable habitat is present.

Map 19. Potential Northern Goshawk Habitat in the Canyonville/Canyon Creek WAU



c. Neotropical Bird Species

Bird species that migrate and spend the winter south of the North American Continent are considered to be neotropical bird species. Bird species that live on the North American Continent year round are called resident birds. Oregon has over 169 bird species that are considered neotropical migrants. Over 25 species are documented to be declining in numbers (Sharp 1990).

Widespread concern for neotropical species, related habitat alterations, impacts from pesticide use, and other threats began in the 1970s and 1980s (Peterjohn et al. 1995). Population trends of neotropical migrants in Oregon show declines and increases. Oregon populations of 19 bird species show statistically significant declining trends while nine other bird species show significant increasing trends (Sharp 1990). Including all species that show declines, increases, or almost statistically significant trends as a proportion of routes, there are 33 species decreasing and 12 species increasing in numbers in Oregon (Sharp 1990).

During 1993, 1994, 1995, 1996, and 1997, neotropical birds were captured and banded, and habitat evaluations were conducted in the South River Resource Area. However, none of this work was done inside the Canyonville/Canyon Creek WAU. Results from a banding station 14 miles from the WAU showed over 50 neotropical bird species used the available habitat types during migration and the breeding season. Given the different vegetation zones within the Canyonville/Canyon Creek WAU, the WAU may provide habitat for more neotropical species than located at the banding station. The unique and diverse habitats found in the Interior Valley vegetative zone have hardwood, shrub, and conifer species not found at the banding station that function as habitat for many neotropical birds.

Approximately 800 acres of private land within the WAU were donated to the Roseburg District BLM in 1996. The Canyon Mountain Fire and subsequent salvage operations changed the age class of stands in this area. The resulting younger stands, in conjunction with the elevation zones and special habitats (i.e. meadows), currently provide diverse habitats used by a number of neotropical birds. Surveys from 1996 to 1998, show 62 bird species are present in this area. Over half (62%) of the species are neotropical migrants. This area supports a variety of bird species, including six neotropical species that are declining in numbers in the State of Oregon (Sharp 1992). Two other species, the purple martin and Lewis' woodpecker, are currently listed as State of Oregon Critical species (listing by ODFW as threatened or endangered is pending).

d. Big Game Species (Elk and Deer)

Historically, the range of Roosevelt Elk extended from the summit of the Cascade Mountains to the Oregon Coast. In 1938, the elk population in Oregon was estimated to be 7,000 animals (Graf 1943). Elk numbers and distribution changed as people settled in the region. Over time, elk habitat areas shifted from the historical distribution to "concentrated population centers which occur as islands across forested lands of varying seral stages" (South Umpqua Planning Unit 1979). Information about the historical distribution of elk within the Canyonville/Canyon Creek WAU and the equivalent management unit set by ODFW is

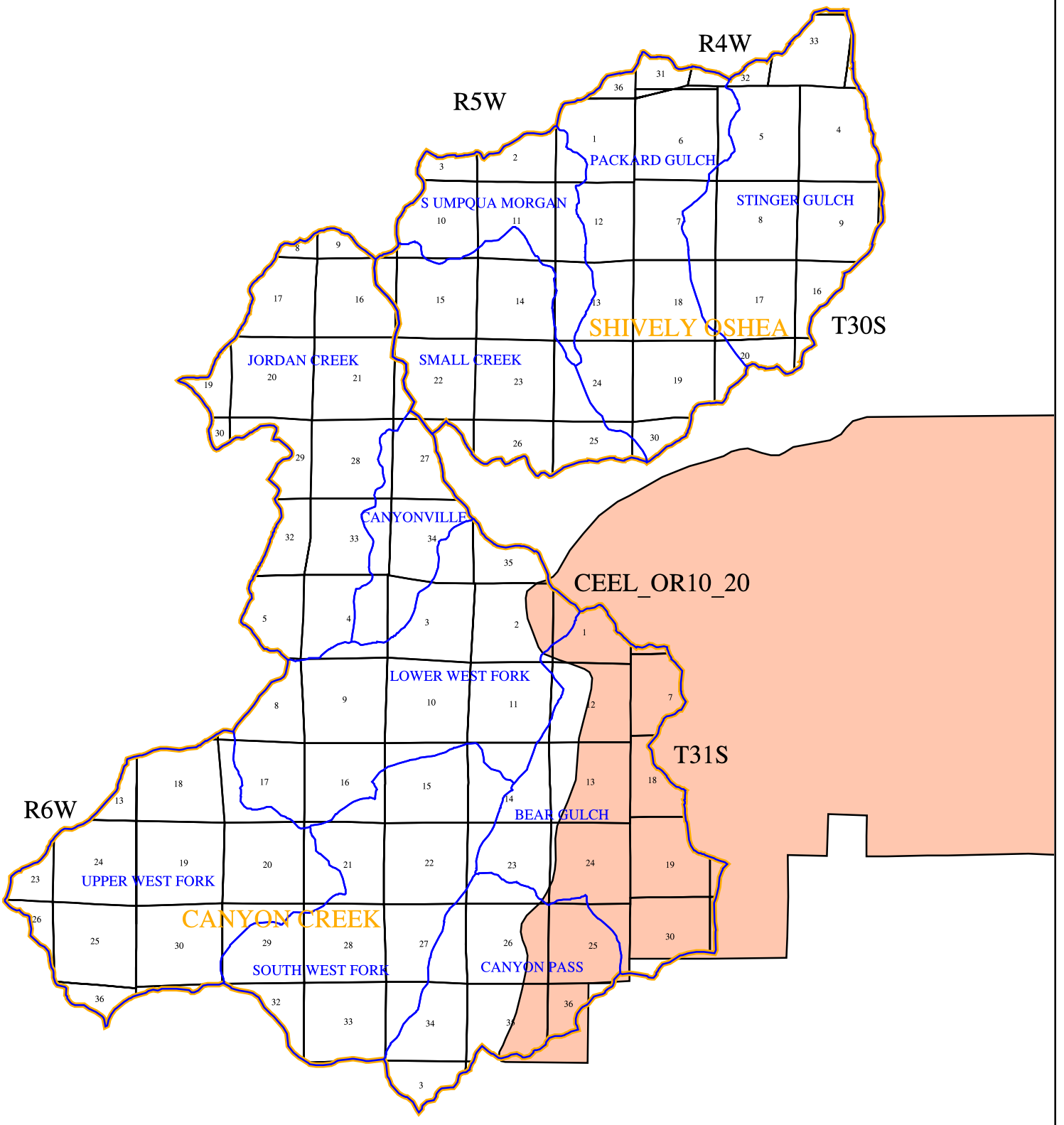
not available. Given the increased number of people, road construction, home construction, and timber harvesting in the area, it is suspected that elk numbers have declined as reported in other parts of the region (Brown 1985).

The WAU includes part of one elk management area identified in the Roseburg District Proposed Roseburg District Resource Management Plan (PRMP) (USDI 1994b). However, management direction for this elk management area was not discussed in the ROD/RMP (USDI 1995). The elk management area is shown on Map 20. Communication with the Oregon Department of Fish and Wildlife identified this area as lacking current elk population estimates. The quality of elk habitat in this management area was evaluated in the PRMP/EIS (USDI 1994b). Using the Wisdom model (Wisdom et al. 1986), cover quality, forage quality, and road density indices were calculated. All three indices were below the minimum levels considered important for optimum use by elk. The habitat indices are general guides for elk management.

The black-tailed deer range is throughout Oregon. During the logging that occurred after WWII, suitable young seral age stands (less than 20 years old) were abundant and black-tailed deer populations increased to the point that liberal hunting seasons were permitted. Overall, black-tailed deer numbers remained stable through the late 1970s in the South Umpqua Planning Unit (South Umpqua Planning Unit 1979).

Current numbers of Roosevelt Elk and black-tailed deer in the Canyonville/Canyon Creek WAU are not available (Personal communication from ODFW). Creation of early seral stands as a result of timber harvesting benefit deer and elk. Elk and deer forage for food in open areas where the vegetation includes grass-forb, shrubs, and open sapling communities. Both species use a range of vegetation age classes for hiding. This hiding component is provided by large shrub, open sapling, closed sapling, and mature or old growth forest communities (Brown 1985).

Map 20. Elk Management Area Within the Canyonville/Canyon Creek Watershed Analysis Unit



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3. Plants

Field surveys have been conducted for Special Status Plants on portions of the Canyonville/Canyon Creek WAU. Four Special Status Plants have been documented to occur in the WAU. The majority of the Special Status Plants documented in the Canyonville/Canyon Creek WAU are found in special or unique areas, such as grass balds, rock outcrops, oak/grass savannas, or oak-madrone-conifer woodlands. Some may occur in mixed conifer forests.

Dichelostemma ida-maia (Firecracker Plant); Tracking Species
The firecracker plant grows in open woods, grassy hillsides, and roadsides at elevations between 1,000 and 4,000 feet from Douglas County, Oregon south through the Siskiyou Mountains into California, where it is more common. It has been sighted in clearcuts, roadcuts, and areas impacted by fire.

Mimulus douglasii (Douglas' Monkey Flower); Assessment Species
Mimulus douglasii grows in open woods and meadows with gravelly soils that are moist in the spring usually below 4,000 feet in elevation. The plant often grows on serpentine soils in Douglas, Curry, Josephine, and Jackson Counties of southwest Oregon to central California.

Pellaea andromedaefolia (Coffee Fern); Assessment Species
Pellaea andromedaefolia is a fern that occurs on dry rock outcrops, mostly in the open, but at times along shaded stream banks and below 4,000 feet in elevation. Distribution ranges from Lane County, Oregon south to Baja, California.

Phacelia verna (Spring Phacelia); Tracking Species
Phacelia verna is an annual forb in the waterleaf family. It blooms from April to June. The distribution range is Southwest Oregon. It grows on mossy sparsely vegetated rock outcrops and balds between 500 to 6,600 feet in elevation. It has been observed to repopulate an area after a low intensity fire.

Five other Special Status Plants are suspected to occur in the Canyonville/Canyon Creek WAU.

Aster vialis (Wayside aster); Bureau Sensitive and Survey and Manage Species
Aster vialis is a rare locally endemic taxon known only from Lane, Linn, and Douglas Counties, in Oregon. It occurs primarily along ridges between Eugene and Roseburg. Plant succession resulting in canopy closure over these plants could be a significant management concern. Long term survival of this species may depend on controlled disturbance of the habitat to allow more light to penetrate the canopy and improve conditions for Aster vialis reproduction. The role of fire is probably important in maintaining viability. Aster vialis seems to thrive most vigorously in openings within old growth stands or associated with edge habitat (Alverson and Kuykendall 1989).

Astragalus umbraticus (Woodland milk vetch); Assessment Species
Woodland milk vetch grows in open woods at low to mid elevations from Southwest Oregon to Northwest California. Woodland milk vetch has been observed in habitat impacted by fire and logging. It is likely this species has become rarer because of fire suppression activities.

Bensoniella oregona (Bensoniella); Bureau Sensitive Species
This species occurs along intermittent streams or meadow edges in mixed evergreen and white fir communities from 3,000 to 5,000 feet in elevation. It is typically less frequent in riparian shrub and forest openings, usually occupying upper slopes and ridgetop saddles with north aspects. It appears to tolerate some disturbance, if subsurface drainage is not altered. Populations along streams without cover, such as in clearcuts, are very small. Bensoniella occurs within very specific meadow and stream edge habitat on soils derived from ancient sedimentary rocks (Copeland 1980 in Lang 1988).

Cypripedium montanum (Mountain Lady's Slipper); Tracking and Survey and Manage Species
Cypripedium montanum populations are small and scattered. Less than 20 populations exist west of the Cascade Mountains. Small populations may reflect the slow establishment and growth rate of this species. Cypripedium montanum seems to persist in areas that have been burned. The species ranges from Southern Alaska and British Columbia to Montana, Idaho, Wyoming, Oregon, and California. Survival of the species may depend on protecting known populations and developing a conservation plan (USDA and USDI 1994a).

Lupinus sulphureus var kincaidii (Kincaids Lupine); Bureau Sensitive Species
This is one of the three varieties of Lupinus sulphureus found in Oregon. It is known to occur in the Willamette Valley and south into Douglas County, with a disjunct population reported in Lewis County, Washington (Eastman 1990). Lupinus sulphureus has been observed growing in road cuts and jeep trails. Long term survival of this species may depend on controlled disturbance of the habitat to allow more light to penetrate the canopy and improve conditions for lupine reproduction (Kaye et al. 1991).

Other plant species to consider include Protection Buffer and Survey and Manage species that are suspected to occur in the Canyonville/Canyon Creek WAU. Protection Buffer species suspected to occur in the WAU include the Bryophytes Buxbaumia viridis, Rhizomnium nudum, Tetraphis feniculata, and Ulota meglospora and the Fungi Aleuria rhenana, Otidea leporina, Otidea onatica, Otidea smithii, Polyozellus multiplex, Sarcosoma mexicana. Survey and Manage plant species suspected to occur in the Canyonville/Canyon Creek WAU are listed in Table F-1 in Appendix F.

Noxious Weeds

Noxious weeds have been identified in the Canyonville/Canyon Creek Watershed Analysis Unit. The encroachment of noxious weeds have been steadily reducing natural resource values. Noxious weed invasions dramatically affect native plant communities, reducing the abundance and distribution of native plants (Bedunah 1992).

The intent of an integrated weed management program is to implement a strategy that will facilitate maintenance and restoration of desirable plant communities and healthy ecosystems. The Bureau of Land Management has an agreement with the Oregon Department of Agriculture (ODA) where locations of noxious weed invasions are identified and monitored by the BLM and control measures are administered by ODA.

The following goals are important in the implementation of integrated weed management:

-Inventory by species
-Identification of potential invaders
-Monitoring
-Prioritization of noxious weed species
-Habitat management and restoration

Yellow Starthistle and Rush Skeletonweed are noxious weeds that have been documented as occurring in the Canyonville/Canyon Creek WAU. These noxious weeds have been designated as Target weed species by ODA.

Yellow Starthistle (Centaurea solstitialis) has been designated by ODA as a Target weed species. Because of the economic threat to the state of Oregon, action against these weeds would be a priority. Yellow Starthistle is native to dry open habitats in Southern Europe. A single Yellow Starthistle plant can produce up to 150,000 seeds under optimum conditions. The ODA would control documented invasions of Yellow Starthistle. The area would be monitored by the BLM for resurgence.

Rush Skeletonweed (Chondrilla juncea) has been designated by ODA as a Target weed species. Because of the economic threat to the state of Oregon, action against these weeds would be a priority. Rush Skeletonweed grows in rangelands and along roadsides. The ODA would control documented invasions of Rush Skeletonweed.

V. Interpretation

A. Vegetation

The main causes for the difference between conditions in 1936 and 1997 are land ownership, mining, management activities, timber harvesting, and natural disturbances. Land ownership and timber harvesting have fragmented forest stands within the WAU. Before fire suppression and timber harvesting activities occurred, stand replacing fires concentrated the early seral stage in more contiguous blocks.

Although private lands are a major component of this Watershed Analysis Unit (63%), the focus of the interpretation will be on BLM administered lands. Private lands are in a constant state of change and although stands greater than 30 years old will continue to be harvested, the timing or amount of harvest can not be predicted.

Bureau of Land Management administered lands available for intensive forest management are those lands outside of Late-Successional Reserves, Riparian Reserves, and other areas reserved or withdrawn from timber harvesting. The WAU contains approximately 6,855 acres (42%) of BLM administered lands that are available for intensive forest management (see Table 21). Silvicultural practices including prescribed fire could be used to obtain desired vegetation conditions in special habitat areas.

Management direction from the Roseburg District RMP states that 15 percent of all federal lands, considering all Land Use Allocations, within fifth field watersheds should remain in late-successional forest stands. The Canyonville/Canyon Creek WAU is within the South Umpqua fifth field watershed. Approximately 59 percent (35,696 acres out of 60,899 acres) of the Federally administered land in the South Umpqua Watershed (the fifth field watershed) is in stands 80 years old or older. Approximately 3.3 percent (1,898 acres out of 58,108 acres) of the BLM administered land within the South Umpqua Watershed is estimated to be harvested per decade. After 30 years, approximately 52 percent (30,140 acres out of 58,108 acres) of the BLM administered land within the South Umpqua Watershed is estimated to be in stands 80 years old or older. After 80 years, approximately 74 percent (44,778 acres out of 60,899 acres) of the Federally administered land in the South Umpqua Watershed is estimated to be in stands 80 years old or older. The South Umpqua Watershed meets the Standard and Guideline to retain 15 percent of all Federal lands within fifth field watersheds in late-successional forest stands and would be expected to continue to meet this Standard and Guideline in the future. This would be expected since 72 percent (43,828 acres out of 60,899 acres) of the Federal land in the South Umpqua Watershed are in some type of reserve.

Matrix lands in the Canyonville/Canyon Creek WAU are to be managed for timber production to help meet the Probable Sale Quantity (PSQ) established in the Roseburg BLM District RMP. Table 22 shows acre estimates of GFMA and Connectivity/Diversity Block Land Use Allocations to be harvested per decade. Approximately 630 acres per decade are estimated to be harvested on BLM administered lands within the Canyonville/Canyon Creek WAU. This would be about nine percent of the 6,855 acres considered

Table 21. Acres of BLM Administered Land by Land Use Allocation.

	Reserved or Withdrawn		Connectivity		GFMA		
Area	Acres	%	Acres	%	Acres	%	Total Acres
Bear Gulch	2,787	83	0	0	572	17	3,359
Canyon Pass	1,548	67	489	21	276	12	2,313
Canyonville	68	34	0	0	132	66	200
Jordan Creek	160	38	50	12	212	50	422
Lower West Fork	1,987	49	813	20	1,217	30	4,017
South West Fork	991	53	305	16	591	31	1,887
Upper West Fork	833	51	455	28	347	21	1,635
Canyon Creek Subwatershed	8,374	61	2,112	15	3,347	24	13,833
Packard Gulch	311	47	248	37	103	16	662
South Umpqua Morgan	170	43	95	24	134	34	399
Small Creek	180	33	316	58	47	9	543
Stinger Gulch	270	37	168	23	284	39	722
Portion of WAU in **Shively-O'Shea Subwatershed**	931	40	827	36	568	24	2,326
Canyonville/Canyon Creek WAU	9,305	58	2,939	18	3,915	24	16,159

available for regeneration harvests within the WAU. Although, less than two percent of the Canyonville/Canyon Creek WAU would be harvested per decade. All of the stands in GFMA greater than 80 years old would be harvested in approximately 80 years and in Connectivity/Diversity Blocks in approximately 190 years.

Table 22. Estimated Acres of Proposed Harvest (per decade) in Matrix in the Canyonville/Canyon Creek WAU.

Subwatershed	GFMA (Acres per decade)	Connectivity/Diversity Block (acres per decade)	Total Acres
Canyon Creek	337	98	435
Portion of WAU in Shively-O'Shea (Formerly known as Canyonville)	141	54	195
Total in WAU	478	152	630

A long range timber harvesting plan has been initiated for the South River Resource Area. The units proposed for timber harvesting are in the planning stage and may change. Field review is needed to verify the suitability for timber harvesting.

The Canyonville portion of the Shively-O'Shea Subwatershed is characterized by scattered smaller tracts with no full sections of BLM managed lands. This area has received very little timber harvesting on BLM managed lands.

The Canyon Creek Subwatershed contains blocks of contiguous BLM managed lands. The 1987 Canyon Mountain Fire burned approximately 5,700 acres. The fire was a low intensity backing type fire over much of the area with some intense fire behavior in pockets on the steeper slopes, which resulted in a stand replacement type of burn. Approximately 450 acres of mature forest was salvaged from BLM managed lands as a result of this fire. The fire also burned younger plantations, as well as changed the stand structure in the remaining mature forests. In some of this area, the large old growth component survived while the smaller mature and understory trees were killed. As a result, many stands which were economically feasible to harvest prior to the fire currently are not sufficiently stocked to allow timber harvesting and still meet the retention tree requirements.

Silviculture actions in the WAU would vary based on Land Use Allocations. Intensive forest management would be expected to occur in General Forest Management Areas. Silviculture actions within Late Successional Reserves and Riparian Reserves would tend to focus on stands regenerated following timber harvesting up to 80 years old. Management actions within LSR 223 would be expected to conform with guidelines contained in the South Umpqua River/Galesville Late Successional Reserve Assessment.

Silvicultural practices applied within Riparian Reserves would be to control stocking, reestablish and manage stands, establish and maintain desired nonconifer vegetation, and acquire desired vegetation characteristics needed to attain Aquatic Conservation Strategy objectives. The following general management guidelines could be altered by site specific evaluations.

1. Early Seral (0 to 30 years old)

The early seral stage consists of approximately 3,520 acres on BLM administered lands. There are 1,924 acres in Matrix, 1,029 acres in Riparian Reserves outside of the LSR, and 549 acres in the LSR. Regeneration on new harvest units is usually achieved by planting seedlings following site preparation. Genetically selected stock would be used, when available. A mixture of species appropriate to the site would be planted, monitored, and maintained to ensure adequate stocking levels. Vegetation treatments may be necessary to allow seedlings to become established.

a. Management Opportunities

1) Precommercial thinning (PCT)

There are approximately 1,541 acres in Matrix and Riparian Reserves and 116 acres in the LSR between 5 and 10 years old that could be precommercially thinned within the next 10 years. The purpose of precommercial thinning is to maintain or improve growth rates, manipulate species composition, and spatial arrangement. This is accomplished by reducing stand density. In the LSR and Riparian Reserves, development of large trees for habitat, snags, and CWD can be accelerated by reducing stand density. Precommercial thinning generally would be conducted on stands in the 10 to 20 year age class with high densities (greater than 300 trees per acre). In Matrix lands and Riparian Reserves adjacent to Matrix lands stands would be thinned to a 13 by 13 foot spacing (which would leave 250 trees per acre) and in the LSR stands would be thinned to a 16 by 16 foot spacing (which would leave 170 trees per acre). Site specific prescriptions could provide for untreated buffer strips along streams to provide bank stability and shade. Density management within the Riparian Reserves is consistent with the ACS objectives to accelerate development of large trees.

Stand Selection Criteria

Typically, potential stands for precommercial thinning are plantations stocked with trees too small to support a commercial harvest operation. Structurally, these stands are usually even-aged, single canopied, and within reasonable biological treatment windows. The optimal biological window for PCT is when the trees are between 10 and 15 years old, the average tree height is 10 to 15 feet tall, and before crowns close enough to cause the lower branches to die. Delaying treatment until after the optimum window has passed results in unrealized growth on the leave trees, longer post-treatment adaptation periods before the stands become windfirm, and heavier fuel loads.

2) Fertilization

Thinned stands in Matrix lands could be fertilized to increase stand growth, improve tree vigor, and reduce insect and drought related mortality. There are 1,836 acres in Matrix lands that could be treated in the next 10 years. This includes units that have been thinned but not fertilized yet and the potential PCT units. Fertilization actions would be designed to apply 200 pounds of available nitrogen per acre by helicopter in the form of urea based prill. Fertilization of thinned stands in the LSR and Riparian Reserves could be employed to increase growth rates of remaining trees.

3) Pruning

Pruning young stands increases wood quality through the production of clear wood in a shorter period than without this action. Pruning in Matrix lands could be done on precommercially thinned trees that have been selected as crop trees. Pruning young sugar pine trees to a height of ten feet may reduce the risk of mortality caused by white pine blister rust.

2. Mid Seral (31 to 80 years old)

The mid seral stage consists of approximately 2,538 acres on BLM administered lands. There are 1,393 acres in Matrix, 1,029 acres in Riparian Reserves, and 418 acres in the LSR. One objective of the Matrix is to provide a sustainable supply of timber and other forest commodities. Commercial thinning, in GFMA, or density management, in Connectivity/Diversity blocks, would be carried out where practical and where increased gains in timber production are likely. The interval of thinning treatment would range from 10 to 30 years. Treatment intervals may vary by site class with poor sites having longer intervals. The location of potential thinning stands are shown by age classes on Map 6. Some stands in the mid seral stage may not benefit from density management. Stands that started out at lower densities may be developing into habitat valuable for late-successional species.

a. Management Opportunities

1) Commercial Thinning/Density Management

The objective of commercial thinning is to maintain or improve tree growth rates and vigor, manipulate species composition, and spatial arrangement. Stands considered suitable for commercial thinning generally have a closed canopy and a relative density index 55% or greater. Relative density index (RDI) is the ratio of actual stand density to the maximum stand density attainable in a stand with the same mean tree volume (Drew and Flewelling 1979). Mortality by competition occurs in stands with a relative density above 55%.

The intensity of the thinning operation would be determined by the Land Use Allocation and the guidelines set forth in the RMP/ROD. There are approximately 1,393 acres in Matrix, 727 acres in Riparian Reserves and 418 acres in the LSR between 31 and 80 years old that could be treated in the next 10 years.

Within the LSR the emphasis would be developing larger trees and diverse stand structures, in Riparian Reserves the emphasis would be restoring the riparian vegetation in accordance with the ACS, and in Matrix the emphasis would be on timber production. Thinning on Matrix lands should maintain the stand at a relative density between 35% to 50%.

An objective of Late Successional Reserves is the development of old growth characteristics. Commercial thinning or density management in young stands between 50 and 70 years old would encourage increased growth of residual trees, develop species diversity by retaining a mixture of species throughout the stand, and provide opportunities to leave some trees as down logs. Management of the LSR within the Canyonville/Canyon Creek WAU would be in conformance with the South Umpqua River/Galesville LSR Assessment.

Riparian Reserves would be managed in accordance with the Aquatic Conservation Strategy. Thinning young stands in Riparian Reserves may be necessary to increase individual tree growth, encourage species diversity, and achieve ACS objectives.

Stand Selection Criteria

Typically, potential stands for commercial thinning or density management are well stocked, even-aged, single canopied, 40 to 70 years old, and have tree diameter distributions which can support a commercial harvest operation under average market conditions. Thinning would generally remove the suppressed and intermediate trees and some of the codominant trees allowing the residual trees room to grow. Leave trees would be healthy, vigorous trees with crown ratios of at least 40% of the height of the more dominant trees.

2) Fertilization

Thinned stands on Matrix lands could be fertilized to increase stand growth, improve tree vigor, and reduce insect and drought related mortality. The same specifications used for PCT would apply to commercially thinned stands.

3. Late Seral (81 years old and older)

a. Management Opportunities

Regeneration harvest

The late seral stage consists of approximately 4,922 acres in Matrix, 2,429 acres in Late-Successional Reserves, and 2,165 acres in Riparian Reserves. No regeneration harvest would be planned in the Late-Successional Reserve or Riparian Reserves.

For the current decade, approximately 305 acres on General Forest Management Lands and approximately 151 acres within Connectivity/Diversity Blocks are planned to be regeneration harvested.

Harvested units would be reforested within one year after completion of site preparation. A mix of species would be planted, based on the species harvested. Douglas-fir, ponderosa pine, sugar pine, incense-cedar, grand fir and hemlock would be the main species used to reforest these areas. Because of the harsh sites, silvicultural practices such as paper mulching, shading, and manual release would be necessary treatments on many of the units to insure reforestation success.

Late seral stands in the Matrix, GFMA and Connectivity/Diversity Blocks, would provide a sustainable supply of timber and other forest commodities. Regeneration harvests in GFMA would be planned for stands nearing culmination of mean annual increment (CMAI), generally between 80 and 110 years old in this area. Regeneration harvests would remove the majority of a stand in a single entry except for six to eight conifer trees per acre. In addition, desired coarse woody debris and snags would be retained to meet management objectives.

Connectivity/Diversity Blocks provide important ecological functions such as dispersal of organisms, carryover of some species from one stand to the next, and maintenance of ecologically valuable structural components such as down logs, snags, and large trees. Connectivity/Diversity Blocks would be managed using a 150 year area control rotation, retaining 12 to 18 green conifers per acre and 120 linear feet of down logs greater than 16 inches in diameter and 16 feet long, and maintaining 25% to 30% of each block in late-successional forests.

There are 14 Connectivity/Diversity Blocks within the Canyonville/Canyon Creek WAU. Thirteen Connectivity/Diversity Blocks are in the Roseburg BLM District and one is in the Medford BLM District. All of the Connectivity/Diversity Blocks have more than 30 percent in late-successional forests (see Table 23). Ten of the 14 Connectivity/Diversity Blocks have more than 25 percent of the late-successional stands in Reserved or Withdrawn areas.

B. Fire and Fuels Management

Treatments of natural fuels may be planned around areas of high recreation use, along heavily traveled road corridors, or on forest stands to reduce the risks of a wildfire occurring, improve habitat of special status plants, or improve forest health. Prescribed underburning, pile burning, and manual or mechanical treatments could be used on areas where wildfire exclusion has resulted in natural fuel accumulations considered unnatural and is considered to be a high risk due to wildfire. Extensive fuels management treatments are difficult to justify, economically, for the sole reason of wildfire risk reduction. Other site specific resource objectives would normally be the basis for prescribing a fuels treatment on natural forest fuels. Prescribed broadcast burning poses risks that in many cases outweigh potential risk reduction benefits. In summary, fuels management treatments including prescribed broadcast burning, pile burning, manual or mechanical fuels treatments, or fuels removal would be applied primarily on activity fuels created from timber management operations.

A Fire Management Plan being prepared for the entire Roseburg District includes descriptions of several Fire Management Zones (FMZ). Fire Management Zones are areas with similar fuel types or where suppression strategies may vary because of special resource concerns. The Canyonville/Canyon Creek

Table 23. Acres of Late Seral Stands in Connectivity/Diversity Blocks in the Canyonville/Canyon Creek WAU.

Connectivity/Diversity Blocks	Total Acres in Block	Acres Reserved or Withdrawn 80 Years Old or Older	Percent	Total Acres 80 Years Old or Older	Percent
Block 7	798	251	31	563	71
Block 8	718	193	27	560	78
Block 11	1,169	503	43	828	71
Block 37	599	171	28	322	54
Block 44	225	114	51	157	70
Block 45	449	141	31	329	73
Block 46	616	127	21	223	36
Block 47	677	192	28	367	54
Block 48	485	151	31	253	52
Block 50	594	131	22	295	50
Block 51	329	131	40	287	87
Block 52	656	95	14	346	53
Block 54	604	166	28	359	59
T32S, R5W, Section 3 (in Medford BLM District)	640	NA	NA	236	37

NA = Data not available.

WAU includes several different Fire Management Zones. Areas in the LSR, within the range of Port-Orford cedar, having granitic soils, and large areas of continuous fuel types differentiate the FMZs in this WAU.

The Canyon Mountain Fire area, which burned in 1987, is considered a unique FMZ because this is a large, continuous areas of the same age and fuel types (grass, low brush, and regenerating stands). This area is not typical, since most areas have more of a patchwork of different age classes and fuel types interspersed between smaller, managed stands. Fine fuels such as grass and low brush significantly increase the potential rate of spread of a fire. The continuity of these fuels across a large area increases the potential for a wind driven fire to become large in a short period of time.

An increased potential for a large fire in the Canyon Mountain Fire area will probably continue for decades. The potential will decrease as the plantations develop closed canopies and as stands on varying slopes and aspects develop different fuel types. Future management of the maturing stands, such as PCT, could again increase the large fire potential if the treatment is done across a large continuous area.

C. Hydrology

Many Drainages in this WAU have been impacted by past forest management activities. Drainages with high road densities, a high percentage of stands less than 30 years old, and numerous stream crossings have probably experienced increased peak flows. Many studies documented the effects road building and timber harvesting can have on stream channels and the hydrology of a watershed (Beschta 1978, Harr et al. 1979, Harr and McCorison 1979, Jones and Grant 1996, and Wemple et al. 1996). Roads can intercept water that would normally infiltrate into the ground and route it to stream channels faster. This causes streamflow to peak quicker and the watershed to store less water for release during times of low streamflow when fish and other aquatic organisms need it most. These impacts, which affect peak flows, have taken place to an even greater extent on private land compared to BLM managed lands.

Currently, the road density for the WAU is 5.29 miles per square mile with only two of the eleven Drainages have a road density below 4.0 miles per square mile. The studies, mentioned previously, indicate current roads densities are having an effect on the hydrology in the WAU.

Timber harvesting and road building have been the main impacts in the forest dominated Drainages of the Canyon Creek Subwatershed. Analyzing the HRP, percent of stands less than 30 years old, road density, stream crossing density, and the current condition of the riparian vegetation can give an indication about the current condition of the watershed (see Table C-2 in Appendix C). Analyzing historic stream gaging records can help to determine whether streams have changed due to land use, or changes in hydrology or climate (Smelser and Schmidt 1998).

Existing water quality in the South Umpqua River where it flows through the WAU is impacted, especially during the summer months during low flows (DEQ 1998). Small tributaries of the South Umpqua River

could be studied and used to reference the impacts (either beneficial or negative) a Drainage is having on the river. Agricultural lands along the South Umpqua River can introduce sediment and nutrients into the river. Agricultural lands can impact the hydrology of a Drainage by decreasing summer flows (by withdrawing water for irrigation), introducing nutrients (from fertilizers and livestock entering streams), increasing sedimentation (due to bare ground and livestock in the riparian zones), and increasing stream temperatures (by removing riparian vegetation).

Areas of the WAU have also been impacted by urban settlement, development, and continued growth. In the Drainages where the BLM manages a small amount of the land, water quality problems may not improve without the cooperation or involvement of other landowners.

D. Fisheries

A rating system was developed to evaluate which Subwatersheds may be most appropriate for timber harvest. The following criteria were used to evaluate the Subwatersheds from the fisheries resource perspective.

Aquatic habitat condition - rating was based on best or potential future best aquatic habitat for cutthroat trout and coho salmon. This rating relied heavily on professional judgement, current aquatic habitat data, and partly on personal observations by biologists in the resource area.

Species diversity - Subwatersheds containing cutthroat, coho, steelhead, and chinook were rated the highest. Subwatersheds with a high degree of diversity (larger number of fish species) received a "4".

Access for anadromous fish - Subwatersheds containing natural blockages (i.e. waterfalls) were rated low (i.e. a "1" or "2"), because these Subwatersheds were never refugia for anadromous fish stocks.

Ownership pattern was considered to a lesser degree. This takes into account how much influence BLM actions would have on cumulative impacts within the Subwatershed and if the BLM administers a significant enough land base to improve current aquatic conditions.

The BLM manages less than 25% of the available anadromous fish-bearing stream reaches in the Canyon Creek Subwatershed. This limits the ability of the BLM to influence the riparian areas adjacent to the fish-bearing stream reaches. Water quality conditions in the WAU may improve due to the BLM applying the SEIS ROD Standards and Guidelines, Riparian Reserve designation, and implementing BMPs when implementing projects.

Through a culvert survey conducted in the WAU, all of the culverts located in fish-bearing streams on BLM administered lands were determined to be adequate for fish passage. Culvert replacement projects should not be necessary within the Canyon Creek Subwatershed, in the near future. Two culverts on BLM administered lands within the WAU were considered to be inadequate to accommodate a 100 year flood

event. One culvert was located in Packard Gulch (the Can-2 culvert) and the other culvert was located off of Packard Creek (the Can-5 culvert). Another culvert (Can-4, on the Unnamed Tributary to the West Fork of Canyon Creek) is adequate for flows but is misaligned with the creek causing water to flow over and erode the road. Some culverts on privately owned lands were considered to be inadequate to accommodate a 100 year flood event.

Some culverts on side tributaries may be blocking fish passage. Since the ODFW surveyors were not specifically surveying for fish presence or absence, there is the possibility fish may be present farther up the system than noted in the aquatic inventories.

The Canyon Mountain Fire in 1987 and timber harvesting have impacted the Canyon Creek Subwatershed. To help restore the effects from these impacts funding and efforts could be concentrated on establishing vegetation in the Riparian Reserves and the upslope areas, in addition to upgrading or decommissioning roads.

E. Wildlife

1. Northern Spotted Owl

Based on the Standards and Guidelines in the SEIS ROD, activity centers on Matrix lands located before January 1 1994, must be protected by maintaining the best 100 acres of suitable habitat near known owl sites (USDA and USDI 1994b). Four spotted owl sites on BLM administered lands within the Canyonville/Canyon Creek WAU are protected with 100 acre activity centers (core areas). Three spotted owl sites, on BLM administered lands, occur within the LSR portion of the WAU.

Land Use Allocations in the Canyonville/Canyon Creek WAU consist of Matrix, Riparian Reserves, and LSR. The Roseburg BLM District ROD/RMP (USDI 1995) identified Matrix lands for timber management while providing for forest connectivity, various habitat types, a variety of forest successional stages, and ecological functions like dispersal of organisms. Managing the timing and spacing of harvest activities in Matrix is important to minimize impacts to spotted owls and other species associated with late-successional habitat.

Late-Successional Reserves are to be managed for late-successional, old-growth forests and the species that use these forests. The amount of suitable habitat on private lands surrounding BLM administered lands in the LSR is low. Future actions by private land owners would most likely reduce the current amount of suitable habitat on private lands.

All of the spotted owl territories on BLM administered land within the Canyonville/Canyon Creek WAU have less than 40% (1,336 acres) of suitable habitat within 1.3 miles of the activity center. Mean values of suitable habitat within 1.3 miles and 0.7 mile of activity centers in the LSR are 1,121 acres and 450 acres, respectively. Activity centers in Matrix have mean values of suitable habitat within 1.3 miles and 0.7

mile of a site are 1,183 acres and 427 acres, respectively. The amount of suitable habitat within 0.7 mile of activity centers is below 500 acres at all but three owl sites in the Canyonville/Canyon Creek WAU (see Table 24).

Table 24. Amount of Suitable Spotted Owl Habitat Within 0.7 Mile and 1.3 Miles of Master Sites and Number of Sites in Each Habitat Category in the Canyonville/Canyon Creek WAU[1].

Owl Site Designation	Greater Than 500 Acres of Suitable Habitat Within 0.7 Mile and Greater Than 1,000 Acres Within 1.3 Miles	Less Than 500 Acres of Suitable Habitat Within 0.7 Mile and Less Than 1,000 Acres Within 1.3 Miles	Less Than 500 Acres of Suitable Habitat Within 0.7 Mile and Greater Than 1,000 Acres Within 1.3 Miles
Master Sites[2] and Alternate Sites in Matrix	1	2	4
Master Sites and Alternate Sites in LSR	2	0	5
Sites in Matrix Active in 1997	0	2	3
Sites in LSR Active in 1997	1	0	2
Potential Sites in Matrix	1	2	2
Potential Sites in LSR	1	0	1

1. All sites are on BLM administered lands.
2. Master site refers to the first number given to a spotted owl activity center. Other activity centers identified in the vicinity of the original site are called alternate sites.

The spotted owl is an example of a species that requires habitat connectivity, dispersal areas, and nesting areas. To assist in the decision making process and to guide the selection of areas where projects such as timber harvests, roads, or recreation sites are located, a ranking of the owl master sites using the provincial radius (1.3 miles) and the 0.7 mile radius surrounding each owl site is presented in Table 18. Table 18 provides information used to evaluate spotted owl sites in the Canyonville/Canyon Creek WAU based on the number of years occupied, years unoccupied, general history, reproduction history, habitat present, and professional judgement about the function of a site based on field experience. The goal was to evaluate the habitat, connectivity and fragmentation of the habitat, and owl site history to create a guide. This guide can be used to locate project areas while taking into account the location of active spotted owl sites. The owl site rankings were used to guide where projects could be planned to maintain the greatest amount of

suitable habitat around the most productive owl sites. The ranking is to provide management with a guide and does not represent a clearance as needed or a may affect determination as required by section 7 of the Endangered Species Act (ESA) of 1973, as amended. The steps used to rank the owl sites are presented in Appendix E.

The results of the owl site rankings for the Canyonville/Canyon Creek WAU are listed in Table 25. Following the guide, activities in the Matrix that modify or remove suitable owl habitat would be considered first in areas outside of known spotted owl territories. When it is not possible to avoid modifying or removing suitable habitat within an owl territory, then sites with a "go to" rank of "one" would be first, "two" would be second, and "three" would be last.

For owl sites in the LSR, the guide ranks where habitat evaluation would be considered first, before manipulating stands to improve habitat. Sites in the LSR with a rank of "1" would be considered first for habitat evaluation, "two" would be second, and "three" would be last. Habitat evaluation would determine which LSR objectives (increasing late seral age forests, increasing physical connectivity of late successional forests, reducing fragmentation, or connectivity of habitat) apply to a particular area.

Table 25. Go To Ranking of Owl Sites in the Canyonville/Canyon Creek WAU.

MATRIX LANDS		LSR	
MSNO[1]	Go To Rank For Timber Harvest	MSNO[1]	Go To Rank For Habitat Evaluation
0366C	3	0365	3
2091	3	1982	3
2092	3		
2210	3		
2292A	3		
4365	3		

[1.] Complex includes original ID number (i.e. 0300) and alternates sites (i.e. 0300A) unless identified as unique. MSNO = Master Site Number.

Table 25 shows all of the owl sites in the WAU are ranked as go to last (3). This means an activity modifying or removing suitable habitat could occur within the territory of any of the owl sites in the WAU, since they are all ranked the same. The guide would still be followed to consider locating projects outside of known territories, outside of the 0.7 mile radius, toward the periphery of territories, and consider the timing of the project to mitigate impacts from habitat modification or removal. All of these options may not be feasible but it is important to consider this thought process and document the planning rationale during the project scoping process.

a. Dispersal Habitat

The Canyonville/Canyon Creek WAU includes the area between two LSRs (LSR 223, part of this LSR is in the WAU, and LSR 259). This area is important for dispersal (movement) of species, particularly spotted owls, between LSRs.

b. Critical Habitat

Two Critical Habitat Units, CHU-OR-63 and CHU-OR-32, lie within the Canyonville/Canyon Creek WAU. The two Critical Habitat Units are within two miles of each other. About three and a half sections within CHU-OR-63 and two sections in CHU-OR-32 are designated Connectivity/Diversity Block sections. Approximately 88 percent of CHU-OR-63 is in Connectivity/Diversity Blocks, which would be managed on a 150 year area control rotation, management direction to maintain at least 25 percent in late-successional forests, and an objective of providing connectivity between LSRs. Critical Habitat Unit OR-63 also lies between LSR 223 and LSR 259. The distance between the CHUs is made up of alternating private and public lands. Riparian Reserves make up about 50% of the BLM administered land that lies between these two CHUs. The Riparian Reserves connect at section corners but lack connection to other BLM administered lands in some areas.

Critical habitat objectives are to provide suitable habitat for a recovering population. The checkerboard ownership in both Critical Habitat Units would probably maintain a fragmented pattern in the future. Managing for well connected habitat in CHU-OR-63 would aid to keep this Critical Habitat Unit functioning.

2. The American Bald Eagle

Potential bald eagle habitat is not present in the vicinity of the South Umpqua River in the middle portion of the Canyonville/Canyon Creek WAU.

3. The Peregrine Falcon

The Canyonville/Canyon Creek WAU lacks potential peregrine falcon habitat in the areas that have been field reviewed.

4. The Marbled Murrelet

The Canyonville/Canyon Creek WAU is outside the marbled murrelet zone. The nearest suitable marbled murrelet habitat is more than two miles from the WAU boundary.

5. Other Species of Concern

a. Great Gray Owl

Potential great gray owl habitat is present in the WAU. General surveys for this species have not been conducted in the WAU.

b. Mollusks

Surveys are needed to determine the extent of mollusk ranges, species abundance, and species diversity within the Canyonville/Canyon Creek WAU. One land snail species (Helminthoglypta hertleini) inhabits habitat similar to the Del Norte salamander.

c. Amphibians

The Canyonville/Canyon Creek WAU lies within 25 miles of known Del Norte salamander sites.

d. Northern Goshawk

There is no data on nest territories or locations within the Canyonville/Canyon Creek WAU.

e. Mammals

The Canyonville/Canyon Creek WAU meets the minimum threshold for red tree vole habitat. Surveys are not required in areas that meet this threshold. General surveys are being conducted within the WAU.

6. Big Game Species (Elk and Deer)

One elk management area identified in the PRMP overlaps into the Canyonville/Canyon Creek WAU. Activities that may help deer and elk include seasonal or long term road closures, better information on actual elk populations in the WAU, and seasonal information use of the available habitat in the WAU.

VI. Recommendations

A. Vegetation

Recommendations for silviculture actions would vary based on Land Use Allocations. Intensive forest management would occur on General Forest Management Areas. Silviculture actions within Late Successional Reserves and Riparian Reserves would tend to focus on stands regenerated following timber harvest or stands that were thinned. Management actions within LSR 223 would need to consider the guidelines presented in the South Umpqua River/Galesville Late Successional Reserve Assessment. Silvicultural practices applied within Riparian Reserves would generally be to control stocking, reestablish and manage stands, establish and maintain desired nonconifer vegetation, and acquire desired vegetation characteristics needed to attain Aquatic Conservation Strategy objectives.

Consider surveying late seral stands underburned in the 1987 Canyon Mountain Fire to determine if they are economical for timber harvesting at this time. If stands do not meet current stocking level standards for timber harvesting, recommended treatments could include underplanting stands with shade tolerant species, such as true firs or cedar species. If the stands are sufficiently stocked, recommended treatments could include precommercial or commercial thinning to reduce stocking and improve growth rates on the remaining trees or regeneration harvesting leaving 12 to 18 of the best trees as a seed source and replant with a mix of conifer species suitable for the site and manage for the younger stand.

Rust resistant stock should be used to reforest western white pine and sugar pine species.

Management activities within the range of Port-Orford cedar should follow the BLM Port-Orford Cedar Management Guidelines to mitigate damage caused by Phytophthora lateralis.

B. Fire and Fuels Management

Fire management in the Canyonville/Canyon Creek WAU should consider aggressively suppressing all wildfires. Because of the checkerboard ownership pattern, very high resource values, air quality concerns, and extremely narrow windows of opportunity, natural ignition prescribed fires are not considered feasible. Risks to life, property, and resources are considered to be too high.

Prescribed fire, both broadcast burning and pile burning, should continue to be used to prepare regeneration harvest units for reforestation when other resource objectives can be achieved. Burning activity fuels achieves a secondary benefit of wildfire hazard reduction. When other resource concerns eliminate using prescribed fire, mechanical or manual fuels treatments may be used to achieve reforestation objectives.

C. Soils

Best Management Practices (BMPs) should be applied during all ground and vegetation disturbing activities. See Appendix D, Roseburg District Record of Decision and Resource Management Plan (USDI 1995) for a list and explanation of BMPs. Along with the BMPs, the Standards and Guidelines in the SEIS Record of Decision (USDA and USDI 1994b) should be implemented in order to achieve proper soil management. Best Management Practices should be monitored for implementation and effectiveness in order to document if soil goals are being achieved.

D. Hydrology

Consider classifying streams in the WAU using the Rosgen stream classification system.

Consider implementing bioengineering techniques with stream restoration opportunities.

When fertilizing, provide adequate buffers on streams and monitor fertilization activities to insure the fertilizer is not applied directly into streams or other bodies of water, especially those having a pH above 8.0, or if the fertilizer were to reach the stream indirectly, the pH and/or primary productivity of the stream would not be increased due to the fertilizer. These are important strategies to consider implementing in the Canyon Creek Subwatershed, which is a municipal watershed for Canyonville.

E. Fisheries

Watershed restoration opportunities may be closely linked to land management activities (i.e. road construction or timber harvest) for the purposes of mitigating the management activity. Streams rated fair or good for habitat condition with high species diversity, low gradients, and easily accessible habitat would be priority areas for watershed restoration.

Consider focusing watershed restoration activities on providing or improving fish passage at failed or failing stream crossings (especially in anadromous fish-bearing stream reaches) and renovating, upgrading, or decommissioning roads. In-stream structures and riparian improvement projects are other restoration activities that could be conducted in the WAU. Potential project areas for instream structure placement to enhance existing anadromous fisheries habitat are in the $SW^1/_4$ of Section 11, T31S, R5W on the mainstem of the West Fork of Canyon Creek. Projects in Section 15, T31S, R5W and Section 21, T31S, R5W on the mainstem of the West Fork of Canyon Creek would enhance existing resident fisheries habitat.

Consider describing how projects within Riparian Reserves meet Aquatic Conservation Strategy objectives using a process similar to what was developed during the Sugar Pine Density Management Project. An example from the Sugar Pine Density Management Project is included on page C-5 of Appendix C.

F. Roads

Roads in the Canyonville/Canyon Creek WAU have been evaluated using the Transportation Management Objectives (TMOs) as a guide. A preliminary list of roads to be decommissioned or improved is listed in Appendix G. The roads are also shown on Map G-1.

Table G-1 identifies road segments that could be considered for decommissioning. Roads considered for decommissioning would be those that were rated as having a low value for future access needs. Roads that access private land would not be decommissioned without the adjacent landowners concurrence.

Natural surfaced roads on BLM administered lands would be the top priority for decommissioning. Decommissioning, also referred to as hydrologic recovery, could be accomplished by removing those elements of a road that concentrate hillslope drainage and cause slope stability, erosion, and sedimentation problems. Decommissioning can include removal of culverts, decompaction of the road surface (tilling), outsloping, waterbarring, and removal of unstable or potentially unstable fills. With decommissioning, most of the road bed may be left in place, facilitating inexpensive reconstruction should the need arise, but hydrologic risks are greatly reduced (USDA et al. 1993 (FEMAT) Appendix V-J).

Table G-2 lists roads which could be considered for either decommissioning or improving. Table G-3 identifies roads which could be considered for improving. Roads to be improved are identified as important for access, but are in need of some treatment. Improving a road could include rocking the road or replacing or adding culverts.

G. Wildlife

1. The Northern Spotted Owl

Consider using the guide ranking spotted owl sites presented in Appendix E and Table 25. Consider evaluating the timing, spacing, and location of timber harvesting to determine the effects on dispersal and suitable habitat in the WAU.

Consider the effects of timber harvesting on dispersal and critical habitat. Using the management guidelines presented in Appendix E and Table 25 may help maintain connected and functional habitat within the WAU.

2. The Peregrine Falcon

The potential peregrine falcon habitat inventory has not been completed, but any high potential habitat that is found should consider the following specific management guides. Management guides include locating a no activity buffer around an active peregrine falcon site, seasonal restrictions during the peregrine falcon breeding season from March 1 to July 15, or maintaining the integrity of medium to high potential sites

(USDI 1995). The buffer should include a no activity area of ½ to 1½ mile radius around known occupied sites. A secondary zone (½ to 1½ mile radius reflecting the shape of the primary zone) should be established where no management activities, such as timber harvesting, road construction, or helicopters are allowed during the peregrine falcon breeding season. Activities may resume in the secondary zone 14 days after fledgling or nest failure is confirmed. To maintain the integrity of a medium to high potential peregrine falcon nesting site, it should be managed as if it was occupied by including a no activity buffer and seasonal restrictions (March 1 to July 15). Projects that require a disturbance, such as blasting, near any medium to high potential habitat, located in the future, should be surveyed before project initiation. Blasting should be restricted if it occurs within three miles of an active site or potentially occupied site.

A resource area wildlife biologist should be consulted to evaluate how close a project is to peregrine falcon habitat. Consider continuing peregrine falcon habitat evaluation in the WAU.

3. Other Species of Concern

a. Great Gray Owl

Evaluate potential habitat and conduct surveys using established protocols to clear potential project areas. Clearance requires a two year survey period of any potential habitat that meets all habitat criteria. Consider conducting general habitat evaluation and search surveys in all Land Use Allocations to collect information on the presence or absence of this species across the landscape.

b. Mollusks

Consider conducting general surveys across all Land Use Allocations in the WAU. Surveys for Survey and Manage mollusk species should be conducted according to established protocol guides before ground disturbing activities are implemented, including commercial thinning and herbicide use. Surveys would be conducted according to the following priorities 1) clearance surveys of FY 1999 and later projects, 2) survey LSRs and Riparian Reserves to document species presence/absence in these areas, and 3) survey managed habitats and adjacent Riparian Reserves to evaluate impacts of harvest and other habitat disturbance on specific mollusk sites.

c. Amphibians

Protocol (IB-OR-96-161) guides for Del Norte salamander state that projects should be evaluated to determine if clearance is required prior to ground disturbing activities. If suitable habitat is present and the project area is within 25 miles of a known site, then surveys and appropriate protection measures are required prior to project implementation. The entire Canyonville/Canyon Creek WAU falls within 25 miles of a known site. All ground disturbing projects should be evaluated using protocol guides prior to implementation.

d. Northern Goshawk and Other Raptors

Consider conducting surveys to determine if and where goshawks are present in the WAU. Consider continuing to gather information about other raptor species that may use habitat in the WAU.

4. Neotropical Birds

Impacts to neotropical birds come from all actions that modify habitat. This usually changes the bird species composition using a particular area. Brushing, precommercial, and commercial activities impact neotropical birds by removing habitat and physically displacing birds. Displacement includes removing occupied habitat during the breeding season.

Ways to benefit neotropical birds would be to reduce impacts from broadcast burning, brushing, regeneration harvesting, precommercial thinning (PCT), commercial thinning, and other activities that manipulate habitat. Scheduling management activities to avoid disturbing birds during nesting and breeding periods should be considered. Local populations of neotropical birds start breeding in April and May and continue through the end of August. However, most species have young capable of flight by the beginning of July or August. Consider implementing projects impacting nesting habitat before April 1 or after July 30 of any given year.

Another way to reduce impacts is to consider the goals of Riparian Reserves when brushing, precommercial thinning (PCT), or broadcast burning areas. Brushing and PCT contracts should consider including different prescriptions for Riparian Reserves. This may include not brushing or thinning within the Riparian Reserves or increasing the number of shrub and non-commercial tree species retained. Matrix lands outside of Riparian Reserves also provide brush and non-commercial tree species used by neotropical birds. Prescriptions in these areas should retain brush and tree species that are not competing directly with the desired conifer species. Some brushing and PCT projects following these recommendations have been accomplished. The results should be reviewed and evaluated.

Consider establishing a neotropical pilot banding station and conducting point count surveys in the area donated to the Bureau of Land Management (T31S, R5W, Sections 2 and 10). Long term management of this area to benefit neotropical birds could include maintaining early seral vegetation (by using prescribed fire, cutting brush, or girdling trees), managing for various vegetation types (by maintaining stands with a diversity of species, especially hardwoods, and age classes), limiting vegetation manipulation in some areas to maintain vegetative patterns, maintaining snag production (by planting trees which would be used for future snag recruitment), or creating snags in areas currently lacking them.

H. Summary of Recommendations

Table 26 summarizes the recommendations, based on the main concerns of current conditions in the Canyonville/Canyon Creek WAU, and identifies the planning objectives to be met by implementing the management strategies and potential activities. The intent of Table 26 was to show the connection between the resource management concerns and the management strategies and recommended activities. The planning objectives are based on legally mandated management direction and policy addressed in the RMP (USDI 1995) and SEIS ROD (USDA and USDI 1994b). The management strategy is intended to describe general methods for meeting the objectives. The management activities are more specific opportunities that may be implemented in order to achieve the management strategy. The data presented in Table 26 is discussed in more detail throughout the watershed analysis.

Table 26. Summary Table of Resource Management Concerns in the Canyonville/Canyon Creek WAU.
Vegetation/Silviculture

Concern	Existing Situation	RMP/NFP Planning Objective	Management Strategy	Management Activity
What opportunities exist to manage overstocked stands, which have slower growth rates, are more susceptible to insects and diseases, and have an increased risk of loss due to wind and fire? How can stand density and species composition be influenced to achieve desired late-successional characteristics in the Riparian Reserves and LSR?	Approximately 4,195 acres of well stocked or overstocked stands on BLM-administered land could be treated during the next ten years to maintain growth and healthy stands.	RMP (Appendix E pp.145-154) - LSR - Plan and implement silvicultural treatments that are beneficial to the creation of late-successional habitat. This can be accomplished by precommercial thinning and commercial thinning in stands up to 80 years old. Riparian Reserves - Apply silvicultural practices for Riparian Reserves to control stocking and acquire desired vegetation characteristics needed to attain ACS objectives. Matrix - Precommercial and commercial thinning would be designed to control stand density, influence species dominance, maintain stand vigor, and place stands on developmental paths.	Manage young stands to maintain or improve growth and vigor, and to improve stand structure and composition to meet LSR and ACS objectives.	Precommercial thinning and density management in the Riparian Reserves and LSR. Precommercial and commercial thinning in Matrix. Fertilization of stands precommercially or commercially thinned in the Matrix. Manipulate PCT slash in all Land Use Allocations. Provide breaks in continuous stand types, especially in the Canyon Mountain Fire area.
Are there opportunities for Matrix lands within this WAU to provide a sustainable supply of timber and other forest commodities?	Approximately 4,922 acres of late seral stands on BLM-administered land in Matrix are available to help provide a sustainable supply of timber and other forest commodities.	RMP (p. 33) - Objectives for Matrix lands are to produce a sustainable supply of timber and other forest commodities and provide early-successional habitat.	Harvest timber and other forest products on Matrix lands.	Conduct regeneration harvest on Matrix lands in conformance with the RMP. Retain six to eight green trees on GFMA lands and 12 to 14 green trees in Connectivity/Diversity Blocks.

Table 26. Summary Table of Resource Management Concerns in the Canyonville/Canyon Creek WAU.
Vegetation/Silviculture

Concern	Existing Situation	RMP/NFP Planning Objective	Management Strategy	Management Activity
Where are opportunities to improve productivity in stands underburned during the Canyon Mountain Fire in 1987?	The 1987 Canyon Mountain Fire underburned a number of late seral stands within the WAU killing the understory and smaller trees leaving only the larger old-growth trees.	RMP (p. 60) - Provide a sustainable supply of timber and other forest products. Manage developing stands on available lands to promote tree survival and growth and to achieve a balance between wood volume production, quality of wood, and timber value at harvest. RMP (Appendix E pp.145-154) - Suitable commercial forest land would be managed to assure a high level of sustained timber productivity. Emphasis would be placed on use of intensive forest management practices and investments to maintain a high level of sustainable resource production while maintaining long-term site productivity, biological legacies, and a biologically diverse forest matrix.	Survey stands in the 1987 Canyon Mountain Fire area which may be understocked and develop recommendations, over time and as funding allows.	Consider surveying stands underburned by the 1987 Canyon Mountain Fire and developing recommendations based on the information gathered from the surveys. Potential treatments could include (but would not be limited to) underplanting, thinning, or regeneration harvesting a stand.

Table 26. Summary Table of Resource Management Concerns in the Canyonville/Canyon Creek WAU.
Soils

Concern	Existing Situation	RMP/NFP Planning Objective	Management Strategy	Management Activity
What management activities have the potential for reducing site productivity on highly sensitive (Category 1) soils?	Category 1 Soils are highly sensitive soils formed from granitic parent materials and having slopes greater than 35 percent. There are approximately 1,488 acres of granitic soils north of the South Umpqua River, with most of this area being considered as Category 1 Soils.	RMP (p. 140) - Evaluate the need for burning based on soils, plant community, and site preparation criteria. Burn under conditions when a light or moderate burn can be achieved on all units to protect soil productivity. The following standards should be followed: Avoid burning on Category 1 Soils (highly sensitive). RMP (pp. 36-37) - The use of prescribed fire on highly sensitive soils (those soils recognized as unusually erodible, nutrient deficient, or low organic matter) will be avoided. Any burning on such soils, if considered essential for resource management, will be accomplished under site specific prescriptions to accomplish the resource objectives and minimize adverse impacts on soil properties. On other soils, prescribed fire prescriptions will be designed to protect beneficial soil properties. Minimize disturbance of identified fragile sites. Appendix D (pp.129-143) contains a summary of management guidance for fragile sites.	Preserve long term soil productivity, nutrient capital, and achieve silvicultural objectives.	Use appropriate methods for reducing vegetative competition on Category 1 Soils. Avoid broadcast burning on Category 1 Soils unless considered essential for resource management.

Table 26. Summary Table of Resource Management Concerns in the Canyonville/Canyon Creek WAU.
Hydrology

Concern	Existing Situation	RMP/NFP Planning Objective	Management Strategy	Management Activity
Are BLM administered lands contributing to the water quality problems in the South Umpqua River? Are BLM administered lands contributing to the low Dissolved Oxygen levels and decreased streamflows in Canyon Creek?	DEQ identified the South Umpqua River between Roberts Creek and Days Creek as water quality limited. DEQ identified Canyon Creek as having low Dissolved Oxygen levels and decreased streamflow in 1988. Data gap - No current information regarding water quality or streamflows on BLM lands within the WAU.	RMP (pp. 19-20, ACS) - Maintain and restore water quality necessary to support healthy riparian, aquatic, and wetland ecosystems. Water quality must remain in the range that maintains the biological, physical, and chemical integrity of the system and benefits survival, growth, reproduction, and migration of individuals composing aquatic and riparian communities. RMP (p. 35) - As directed by the Clean Water Act, comply with state water quality requirements to restore and maintain water quality to protect the recognized beneficial uses for the South Coast and Umpqua Basins.	Address Data Gaps regarding water quality information on BLM-administered lands, over time and as funding allows.	Consider collecting water quality data (such as pH, temperature, or dissolved oxygen) on BLM-administered lands to determine if they are contributing to water quality concerns. Acquire data (Douglas County's West Fork Canyon Creek stream gage) to help determine if BLM administered lands are contributing to the low DO levels and decreased streamflows.

Table 26. Summary Table of Resource Management Concerns in the Canyonville/Canyon Creek WAU.
Fisheries

Concern	Existing Situation	RMP/NFP Planning Objective	Management Strategy	Management Activity
What opportunities exist to enhance the fisheries resource and/or the habitat?	The Umpqua River cutthroat trout and Oregon Coast coho salmon are listed as endangered and threatened species, respectively, under the ESA. Both species have been documented within this WAU.	RMP (p. 40) - Promote the rehabilitation and protection of fish stocks at risk and their habitat. RMP (p. 41) - Protect, manage, and conserve Federal listed and proposed species and their habitats to achieve their recovery in compliance with the Endangered Species Act, approved recovery plans, and Bureau special status species.	a. Protect existing stream habitat conditions, water quality, and water quantity. b. Focus restoration on: 1. providing fish passage at failed or failing stream crossing sites, especially those sites located in anadromous fish-bearing stream reaches, 2. maintaining, upgrading, or decommissioning roads identified in the TMOs (see Appendix G), 3. conducting in-stream restoration, which may include in-stream structures and riparian improvement projects.	a. Consider using timing and spatial arrangement of timber harvesting and other major land disturbance activities (i.e. road construction) within this WAU to reduce adverse effects on fish species. b. Possible restoration activities could include, but may not be limited to, fish passage improvements, stabilizing roads and road fills, sidecast pullback, adding cross drains on roads with poor drainage, resurfacing existing rock roads, surfacing natural surfaced roads, blocking and subsoiling roads to reduce road density and road related sediment production, placing logs and boulders in streams to create spawning and rearing habitat, placing fine and coarse materials for over-wintering habitat, and establishing or releasing existing conifers in riparian areas.

Table 26. Summary Table of Resource Management Concerns in the Canyonville/Canyon Creek WAU.
Roads

Concern	Existing Situation	RMP/NFP Planning Objective	Management Strategy	Management Activity
Are some BLM managed roads eroding and delivering excess sediment to stream channels and adversely affecting water quality and fish? Are BLM managed roads changing peak flows, impacting stream morphology, or adding to the drainage network in the WAU?	Some BLM roads have been identified to be eroding or having slope stability concerns. Average road density of 5.29 miles per square mile and stream crossing density of 2.01 crossings per stream mile in the WAU may increase sediment in streams that is outside the range of natural variability. Data Gap - No information regarding if BLM managed roads are causing increased sediment in streams, peak flows, or the drainage network.	RMP (pp. 72-74) - Develop and maintain a transportation system to meet the needs of users in an environmentally sound manner. RMP (p. 72) - Correct problems associated with high road density by emphasizing the reduction of minor collector and local road densities where those problems exist. RMP (pp. 19-20, ACS) - Maintain and restore the sediment regime... - The timing, magnitude, duration, and spatial distribution of peak, high, and low flows must be protected.	Minimize new road construction in areas with fragile soils (granitic, schist, and pyroclastic soils) to reduce impacts to soils, water quality, and fisheries. Stabilize existing roads where they contribute to significant adverse affects on these resources. Locate, design, construct, and maintain roads to standards that meet management objectives in accordance with the district road management plan. Prioritize and address erosion or slope stability concerns caused by roads based on current and potential impacts to riparian resources and the ecological value of the riparian resources affected. Minimize sediment delivery to streams.	Consider conducting road and stream surveys, which would include looking at downcutting of stream channels, road encroachment, and culvert surveys. Possible restoration activities could include road treatments mentioned in the Fisheries section of this table. Prioritize and schedule maintenance on roads identified to be eroding or having slope stability problems. Consider closing, stabilizing, or decommissioning roads identified to be eroding or having slope stability problems, as determined by short-term and long-term transportation and resource management needs.

Table 26. Summary Table of Resource Management Concerns in the Canyonville/Canyon Creek WAU.
Wildlife

Concern	Existing Situation	RMP/NFP Planning	Management Strategy	Management Activity
How can suitable habitat around spotted owl sites be managed following the Standards and Guidelines to minimize effects on the spotted owl?	Seven spotted owl sites are located in the WAU. All are below threshold levels of 40% suitable habitat within a 1.3 mile radius around the owl activity center.	RMP (p. 41) - Protect, manage, and conserve Federal listed and proposed species and their habitats to achieve their recovery in compliance with the Endangered Species Act, approved recovery plans, and Bureau special status species.	RMP (p.48) - Retain 100 acres of the best northern spotted owl habitat as close to the nest site or owl activity center as possible for all known (as of January 1, 1994) spotted owl activity centers. Human activity within 1/4 mile of nest sites which could disturb owl nesting activities will be restricted, especially the use of large power equipment and falling of trees. Restrictions will apply from March 1 to September 30 or until non-nesting status is confirmed using protocol procedures. The retention of adequate habitat conditions for dispersal of the northern spotted owl will be taken into account during watershed analysis that addresses the issue of adjusting Riparian Reserve widths.	Consider using timing and location of habitat removal or modification on the landscape to reduce effects within known territories. Plan timber harvesting activities that consider owl site condition, connection to other habitat, and the ranking of the owl sites in this analysis. Consider conducting near future timber harvesting activities outside of known 1.3 mile territories or in the periphery of the territory and outside of the 0.7 mile radius of known activity centers, when possible.
Is there potential Great gray owl habitat within the WAU? The Great gray owl is a Protection Buffer Species.	Great gray owls may occur in coniferous forests adjacent to meadows. There are approximately 510 acres of potential suitable habitat at or above 3,000 feet in elevation on BLM administered land in the WAU.	RMP (p. 41) - Protect SEIS Special Attention Species so as not to elevate their status to any higher level of concern.	RMP (p. 44) - The RMP/NFP established Late-Successional Reserves for the Protection Buffers of the Great gray owl. Specific mitigation measures for the great gray owl, within the range of the northern spotted owl, include the following: provide a no harvest buffer of 300 feet around meadows and natural openings and establish 1/4 mile protection zones around known nest sites. Survey for nest location using the established protocols. Protect all future discovered nest sites.	Conduct surveys using established protocols to clear potential project areas. A two year survey protocol is required if the habitat meets all of the protocol criteria.

Table 26. Summary Table of Resource Management Concerns in the Canyonville/Canyon Creek WAU.
Wildlife

Concern	Existing Situation	RMP/NFP Planning	Management Strategy	Management Activity
Are there survey and manage mollusk species present in the WAU?	Four survey and manage mollusk species are present in Douglas County. One mollusk, the blue-grey taildropper was documented to occur in the WAU.	RMP (p. 41) - Protect SEIS Special Attention Species so as not to elevate their status to any higher level of concern.	Collect information on survey and manage mollusk species present in the WAU. Identify what type of or how much habitat is necessary.	Consider conducting general surveys in all LUAs using established protocols to identify population distribution across the landscape. Consider conducting pre- and postharvest surveys to monitor effects on mollusks. Conduct clearance surveys prior to implementing ground disturbing activities.
Is there potential Del Norte salamander habitat within the WAU? Is the WAU within 25 miles of a known site? Is the Del Norte salamander present in the WAU?	There are approximately 5,033 acres of talus habitat associated with stands that are at least 80 years old on BLM administered land. The entire WAU is within 25 miles of a known site. This salamander may be in the WAU but has not been documented to occur in the WAU.	The Del Norte salamander is a Protection Buffer and a Survey and Manage Survey Strategy 2 Species. RMP (p.41) - Protect SEIS Special Attention Species so as not to elevate their status to any higher level of concern.	RMP (p.45) - Survey prior to activities and manage sites within the known or suspected ranges and within the habitat types of vegetation communities associated with the Del Norte salamander.	Consider conducting surveys using protocol methods to determine if suitable habitat occurs in the WAU. Conduct surveys for the Del Norte salamander prior to ground disturbing activities in the WAU.

Table 26. Summary Table of Resource Management Concerns in the Canyonville/Canyon Creek WAU.
Wildlife

Concern	Existing Situation	RMP/NFP Planning	Management Strategy	Management Activity
The northern goshawk is a Bureau Sensitive species. Is there northern goshawk habitat within the WAU?	The northern goshawk is not common in the Roseburg District but is within the geographic range. There are approximately 10,223 acres of potential habitat on all lands within the WAU, based on GIS. On BLM administered land in the WAU, about 661 acres have the best potential for being habitat.	RMP (p. 41) - Manage for the conservation of Federal Candidate and Bureau Sensitive species and their habitats so as not to contribute to the need to list and to recover the species.	RMP (p. 49) - Retain 30 acre buffers of undisturbed habitat around active and alternative nest sites. Restrict human activity and disturbance within 1/4 mile of active sites between March and August or until such time as young have dispersed. Consider this species when planning or implementing ground disturbing projects.	Consider conducting field reviews to verify and evaluate potential habitat. Use standard protocol survey methods to clear areas where projects may remove or modify suitable habitat. Consider identifying and managing a post fledgling area around an activity center.
Are there neotropical bird species present in the WAU?	Over 60 neotropical bird species use the WAU for breeding, feeding, or foraging.	RMP (p. 37) - Enhance and maintain biological diversity and ecosystem health to contribute to healthy wildlife populations.	Use the watershed analysis process to address wildlife habitat issues for individual watersheds.	Consider conducting and evaluating a pilot neotropical bird banding station in T31S, R5W, Sections 2 and 10. Consider managing this area to provide long term neotropical bird habitat. Opportunities could include determining when management is needed to maintain habitat, such as using fire or the selective planting of conifers. For projects in the WAU impacting neotropical habitat consider using seasonal restrictions, timing, different prescriptions, and other vegetation manipulation activities to mitigate impacts, when possible.

VIII. Monitoring

General objectives of monitoring are:
1) To determine if the plan is being implemented correctly.
2) Determine the effectiveness of management practices at multiple scales, ranging from individual sites to watersheds.
3) Validate whether ecosystem functions and processes have been maintained as predicted.

The Roseburg RMP, Appendix I provides monitoring guidelines for various land use allocations and resources discussed by the plan. Implementation, effectiveness, and validation monitoring questions are addressed. Management actions on the Roseburg District BLM may be monitored prior to project initiation and following project completion, depending on the resource or activity being monitored.

Some key resource elements that may be monitored in the Canyonville/Canyon Creek WAU are as follows:

A. All land use allocations

Are surveys for the species listed in the Roseburg District RMP, Appendix H conducted before ground disturbing activities occur?
Are protection buffers being provided for specific rare and locally endemic species and other species in the upland forest matrix?
Are the sites of amphibians, mammals, bryophytes, mollusks, vascular plants, fungi, lichens, and arthropod species listed in Appendix H of the Roseburg District RMP being surveyed?
Are the sites of amphibians, mammals, bryophytes, mollusks, vascular plants, fungi, lichens, and arthropod species listed in Appendix H of the Roseburg District RMP being protected?
Are high priority sites for species management being identified?

B. Riparian Reserves

Is the width and integrity of the Riparian Reserves maintained?
Are management activities within Riparian Reserves consistent with SEIS ROD Standards and Guideline, RMP management direction, and Aquatic Conservation Strategy objectives?
Has Watershed Analysis been completed prior to on-the-ground actions being initiated in Riparian Reserves?

C. Matrix

Are suitable numbers of snags, coarse woody debris, and green trees being left following timber harvesting as called for in the SEIS ROD Standards and Guidelines and Roseburg RMP management direction?
Are timber sales being designed to meet ecosystem objectives for the Matrix?

Are forests growing at a rate that will produce the predicted yields?
Are forests in the Matrix providing for connectivity between Late-Successional Reserves?

D. Late-Successional Reserves

What activities were conducted or authorized within the LSR and how were they compatible with objectives of the LSR Assessment?
Were activities consistent with the SEIS ROD Standards and Guidelines, Roseburg RMP management direction, the LSR Assessment, and REO review requirements?
What is the status of development and implementation plans to eliminate or control non-native species which adversely impact late-successional objectives?
Are projects conducted in the LSR designed to maintain, improve, or attain LSR objectives?

IX. Revisions to the Watershed Analysis and Data Gaps

Watershed analysis is an ongoing, iterative process designed to help define important resource information needed for making sound management decisions. This watershed analysis would, generally, be updated as existing information is refined, new data becomes available, new issues develop, when significant changes occur in the WAU, or as management needs dictate.

Data gaps include the amount of terrestrial large woody debris occurring in late-successional/old-growth stands within the Canyonville/Canyon Creek WAU, water quality, summer baseflow, and stream temperature information.

Appendix A

Glossary

Age Class - One of the intervals into which the age range of trees is divided for classification or use.

Anadromous Fish - Fish that are born and reared in freshwater, move to the ocean to grow and mature, and return to freshwater to reproduce. Salmon, steelhead, and shad are examples.

Aquatic Conservation Strategy - Plan developed in Standards and Guidelines for Management of Habitat for Late-Successional and Old-Growth Forest Related Species Within the Range of the Northern Spotted Owl, designed to maintain and restore ecosystem health at watershed and landscape scales to protect habitat for fish and other riparian-dependent species and resources and restore currently degraded habitats.

Beneficial Use - The reasonable use of water for a purpose consistent with the laws and best interest of the peoples of the state. Such uses include, but are not limited to, the following: instream, out of stream and groundwater uses, domestic, municipal, industrial water supply, mining, irrigation, livestock watering, fish and aquatic life, wildlife, fishing, water contact recreation, aesthetics and scenic attraction, hydropower, and commercial navigation.

Best Management Practices (BMPs) - Methods, measures, or practices designed to prevent or reduce water pollution. Not limited to structural and nonstructural controls, and procedures for operations and maintenance. Usually, Best Management Practices are applied as a system of practices rather than a single practice.

Bureau Assessment Species - Plant and animal species on List 2 of the Oregon Natural Heritage Data Base, or those species on the Oregon List of Sensitive Wildlife Species (OAR 635-100-040), which are identified in BLM Instruction Memo No. OR-91-57, and are not included as federal candidate, state listed or Bureau sensitive species.

Bureau Sensitive Species - Plant or animal species eligible for federal listed, federal candidate, state listed, or state candidate (plant) status, or on List 1 in the Oregon Natural Heritage Data Base, or approved for this category by the State Director.

Candidate Species - Those plants and animals included in Federal Register "Notices of Review" that are being considered by the United States Fish and Wildlife Service (FWS) for listing as threatened or endangered.

> Category 1. Taxa for which the Fish and Wildlife Service has substantial information on hand to support proposing the species for listing as threatened or endangered. Listing proposals are either being prepared or have been delayed by higher priority listing work.

Commercial Thinning - The removal of merchantable trees from an even-aged stand to encourage growth of the remaining trees.

Connectivity - A measure of the extent to which conditions between late-successional/old-growth forest areas provide habitat for breeding, feeding, dispersal, and movement of late-successional/old-growth-associated wildlife and fish species.

Connectivity/Diversity Block - A land use classification under Matrix lands managed on 150 year area control rotations. Periodic timber sales will leave 12 to 18 green trees per acre.

Core Area - That area of habitat essential in the breeding, nesting and rearing of young, up to the point of dispersal of the young.

Critical Habitat - Under the Endangered Species Act, (1) the specific areas within the geographic area occupied by a federally listed species on which are found physical and biological features essential to the conservation of the species, and that may require special management considerations or protection; and (2) specific areas outside the geographic area occupied by a listed species when it is determined that such areas are essential for the conservation of the species.

Density Management - Cutting of trees for the primary purpose of widening their spacing so that growth of remaining trees can be accelerated. Density management harvest can also be used to improve forest health, to open the forest canopy, or to accelerate the attainment of old growth characteristics if maintenance or restoration of biological diversity is the objective.

District Defined Reserves (DDR) - Areas designated for the protection of specific resources, flora and fauna, and other values. These areas are not included in other land use allocations nor in the calculation of the Probable Sale Quantity.

Endangered Species - Any species defined through the Endangered Species Act as being in danger of extinction throughout all or a significant portion of its range and published in the Federal Register.

Endemic - Native or confined to a certain locality.

Environmental Assessment (EA) - A systematic analysis of site-specific BLM activities used to determine whether such activities have a significant effect on the quality of the human environment and whether a formal environmental impact statement is required; and to aid an agency's compliance with National Environmental Protection Agency when no Environmental Impact Statement is necessary.

Ephemeral Stream - Streams that contain running water only sporadically, such as during and following storm events.

50-11-40 Rule - A proposed guideline requiring maintenance of adequate spotted owl dispersal habitat on lands outside designated "habitat conservation areas" for the Northern Spotted Owl. It would assure that, on the quarter township basis, 50 percent of the stands would have conifers averaging 11 inches dbh and a 40 percent canopy closure.

Fluvial - Migratory behavior of fish moving away from the natal stream to feed, grow, and mature then returning to the natal stream to spawn.

General Forest Management Area (GFMA) - Forest land managed on a regeneration harvest cycle of 70-110 years. A biological legacy of six to eight green trees per acre would be retained to assure forest health. Commercial thinning would be applied where practicable and where research indicates there would be gains in timber production.

GIS - Geographic Information System, a computer based mapping system used in planning and analysis.

Intermittent Stream - Any nonpermanent flowing drainage feature having a definable channel and evidence of scour or deposition. This includes what are sometimes referred to as ephemeral streams if they meet these two criteria.

Issue - A matter of controversy or dispute over resource management activities that is well defined or topically discrete. Addressed in the design of planning alternatives.

Land Use Allocations - Allocations which define allowable uses/activities, restricted uses/activities, and prohibited uses/activities. They may be expressed in terms of area such as acres or miles etc. Each allocation is associated with a specific management objective.

Late-Successional Forests - Forest seral stages which include mature and old-growth age classes.

Late-Successional Reserve (LSR) - A forest in its mature and/or old-growth stages that has been reserved.

Matrix Lands - Federal land outside of reserves and special management areas that will be available for timber harvest at varying levels.

Mitigating Measures - Modifications of actions which (a) avoid impacts by not taking a certain action or parts of an action; (b) minimize impacts by limiting the degree or magnitude of the action and its implementation; (c) rectify impacts by repairing, rehabilitating or restoring the affected environment; (d) reduce or eliminate impacts over time by preservation and maintenance operations during the life of the action; or (e) compensate for impacts by replacing or providing substitute resources or environments.

Monitoring - The process of collecting information to evaluate if objectives and anticipated or assumed results of a management plan are being realized or if implementation is proceeding as planned.

Nonpoint Source Pollution - Water pollution that does not result from a discharge at a specific, single location (such as a single pipe) but generally results from land runoff, precipitation, atmospheric deposition or percolation, and normally is associated with agricultural, silvicultural and urban runoff, runoff from construction activities, etc. Such pollution results in the human-made or human-induced alteration of the chemical, physical, biological, radiological integrity of water.

Orographic - Of or pertaining to the physical geography of mountains and mountain ranges.

Peak Flow - The highest amount of stream or river flow occurring in a year or from a single storm event.

Perennial Stream - A stream that has running water on a year round basis.

Phenotypic - Of or pertaining to the environmentally and genetically determined observable appearance of an organism.

Precommercial Thinning (PCT) - The practice of removing some of the trees less than merchantable size from a stand so that remaining trees will grow faster.

Probable Sale Quantity (PSQ) - Probable sale quantity estimates the allowable harvest levels for the various alternatives that could be maintained without decline over the long term if the schedule of harvests and regeneration were followed. "Allowable" was changed to "probable" to reflect uncertainty in the calculations for some alternatives. Probable sale quantity is otherwise comparable to allowable sale quantity (ASQ). However, probable sale quantity does not reflect a commitment to a specific cut level. Probable sale quantity includes only scheduled or regulated yields and does not include "other wood" or volume of cull and other products that are not normally part of allowable sale quantity calculations.

Proposed Threatened or Endangered Species - Plant or animal species proposed by the U.S. Fish & Wildlife Service or National Marine Fisheries Service to be biologically appropriate for listing as threatened or endangered, and published in the Federal Register. It is not a final designation.

Resident Fish - Fish that are born, reared, and reproduce in freshwater.

Resource Management Plan (RMP) - A land use plan prepared by the BLM under current regulations in accordance with the Federal Land Policy and Management Act.

Riparian Reserves - Designated riparian areas found outside Late-Successional Reserves.

Riparian Zone - Those terrestrial areas where the vegetation complex and microclimate conditions are products of the combined presence and influence of perennial and/or intermittent water, associated high water tables and soils which exhibit some wetness characteristics. Normally used to refer to the zone within which plants grow rooted in the water table of these rivers, streams, lakes, ponds, reservoirs, springs, marshes, seeps, bogs and wet meadows.

Stream Order - A hydrologic system of stream classification. Each small unbranched tributary is a first order stream. Two first order streams join to form a second order stream. A third order stream has only first and second order tributaries, and so on.

Stream Reach - An individual first order stream or a segment of another stream that has beginning and ending points at a stream confluence. Reach end points are normally designated where a tributary confluence changes the channel character or order. Although reaches identified by BLM are variable in length, they normally have a range of 1/2 to 1-1/2 miles in length unless channel character, confluence distribution, or management considerations require variance.

Survey and Manage - Those species that are listed in Table C-3 of the Standards and Guidelines for Management of Habitat for Late-Successional and Old-Growth Forest Related Species Within the Range of the Northern Spotted Owl for which four survey strategies are defined.

Tillage - Breaking up the compacted soil mass to promote the free movement of water and air using a self drafting individual tripping winged subsoiler.

Transportation Management Objectives (TMO) - An evaluation of the current BLM transportation system to assess future need for roads, and identify road problem areas which need attention, and address future maintenance needs.

Watershed - The drainage basin contributing water, organic matter, dissolved nutrients, and sediments to a stream or lake.

Watershed Analysis - A systematic procedure for characterizing watershed and ecological processes to meet specific management and social objectives. Watershed analysis is a stratum of ecosystem management planning applied to watersheds of approximately 20 to 200 square miles.

Appendix B

References

Appendix B - References

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Appendix C
Fisheries

Table C-1. ODFW Aquatic Habitat Inventory Data.

Stream	Reach	% Pool Area	Residual Pool Depth	Riffle W/D Ratio	% Fines in Riffles	% Gravel in Riffles	Riparian Vegetation (dominant/subdominant)	Riparian Conifer Size	% Shade	LWD pieces per 100m	LWD vol per 100m	AHR
Canyon Cr	1	56.1	.5	26.9	0	34	hdwd/con	small	75	1.1	.8	fair
	2	55.6	.4	21.5	2	27	hdwd/con	small	86	.8	.6	fair
	3	43.4	.3	17.6	1	33	hdwd/con	small	92	.5	.1	fair
	4	37.3	.3	14.5	0	44	con/hdwd	small	83	.8	.1	fair
	5	32.6	.3	10.8	0	71	con/hdwd	small	80	.6	.4	fair
	6	--	0	--	--	--	hdwd/con	medium	89	.6	.4	poor
W Fork Canyon	1	44.5	.4	34.2	0	37	hdwd/con	medium	75	8.0	5.6	poor
	2	44.1	.5	33	0	49	hdwd/con	medium	73	8.6	7.8	fair
	3	36.3	.5	26.1	0	32	hdwd/con	medium	76	2.0	3.2	fair
	4	21.9	.5	17.6	0	15	hdwd/con	small	70	5.6	7.9	fair
	5*	--	--	--	--	--	--	--	--	--	--	poor*
	6	30.5	.4	19.2	2	45	hdwd/con	small	81	4.8	7.2	fair
	7	20.3	.3	15.4	2	67	hdwd/con	small	93	10.6	5.7	fair
	8	27.5	.3	10.5	5	93	hdwd/con	small	93	19.0	28.2	fair
	9	0	0	--	0	0	hdwd/con	small	98	27.4	43.7	fair
W F Canyon Tributary	1	32.4	.4	14.1	6	39	hdwd/con	small	57	25.3	8.5	fair
	2	30.0	.5	14.1	5	57	hdwd/con	medium	77	48.5	53.3	good
	3	28.2	.3	11.3	10	64	hdwd/con	medium	81	17.8	25.3	fair
	4	1.7	.3	4.3	15	75	con/hdwd	small	93	14.0	18.1	fair
St John Cr	1	25.7	.4	11.9	4	48	hdwd/con	small	84	13.5	17.5	fair
	2	4.4	.3	5	5	90	hdwd/con	small	94	28.3	43.5	good
	3	--	0	--	--	--	hdwd/con	small	88	27.7	66.4	poor

AHR = Aquatic Habitat Rating

* = Win Walker Reservoir, unsurveyed

-- = no data available

Table C-2. Summary Table of Current Conditions in the Canyonville/Canyon Creek WAU.

Drainage Name Subwatershed Name	Road Density	Stream Density	% BLM Ownership	Stream Crossing Density	Percent Less Than 30 Years Old	HRP %	Percent of Riparian Reserves at Least 80 Years Old
Bear Gulch	4.89	6.57	71	1.82	14	95	62
Canyon Pass	3.74	4.74	77	1.08	16	92	61
Canyonville	8.60	3.13	14	2.47	5	97	100
Jordan Creek	6.29	4.41	8	2.15	5	99	63
Lower West Fork	3.76	4.83	76	1.90	30	86	44
South West Fork	4.94	6.30	42	1.98	16	93	48
Upper West Fork	4.87	6.32	32	2.22	6	96	48
Canyon Creek Subwatershed	5.00	5.43	47	1.94	14	94	54
Packard Gulch	6.55	5.46	14	2.27	12	100	56
South Umpqua Morgan	5.95	7.22	20	2.32	10	100	33
Small Creek	4.00	4.68	15	1.04	0	100	86
Stinger Gulch	6.63	4.60	16	2.73	5	99	75
Portion of WAU in the **Shively-O'Shea Subwatershed**	5.88	5.25	17	2.14	7	100	63
Canyonville/Canyon Creek WAU	5.29	5.37	37	2.01	12	96	55

Table C-3. Matrix of Factors and Indicators
Western Cascades Physiographic Region

FACTORS	INDICATORS	PROPERLY FUNCTIONING	AT RISK	NOT PROPERLY FUNCTIONING
Water Quality	Temperature	2nd - 3rd order basins: < 58 degrees F. 4th and larger basins: < 65 degrees F.	2nd - 3rd order: 59 - 65 degrees F. 4th + order: 66 - 72 degrees F.	2nd - 3rd order basins: > 65 degrees F. 4th and larger basins: > 72 degrees F.
	Sediment/Turbidity *	< 12% fines (< 0.85 mm) in gravel, turbidity low, or cobble embeddedness < 35%.	12 - 17% fines (< 0.85 mm) in gravel.	> 17% fines (< 0.85 mm) in gravels, turbidity high, or cobble embeddedness > 35%.
	Chemical Contamination/Nutrients	Low levels of chemical contaminants from agricultural, industrial and other sources, no excess nutrients, no CWA 303d designated reaches.		Moderate levels of chemical contamination from agricultural, industrial and other sources, any level of excess nutrients, one or more CWA 303d designated reaches.
Habitat Access	Physical Barriers	Any man-made barriers present in watershed allow upstream and downstream fish passage at all flows of age 1 + salmonids		Any man-made barriers present in watershed do not allow upstream and/or downstream fish passage at a range of flows of age 1 + salmonids
Habitat Elements	Substrate *	Dominant substrate is gravel or cobble (interstitial spaces clear), embeddedness < 20%.	Gravel and/or cobble is subdominant, or if dominant, embeddedness 20 - 35% (3)	Bedrock, sand, silt, or small gravel dominant, or if gravel and cobble dominant, embeddedness > 35% (2)
	Large Woody Debris	> 60 pieces/mile, > 24" diam. and > 50 feet in length. Adequate sources of future LWD to maintain the above standard. Little evidence of stream clean-out or management related debris flows.	30 - 60 pieces/mile, > 24" and > 50 feet in length or lacks potential sources of LWD sufficient to maintain or achieve the fully functioning standard.	< 30 pieces/mile, > 24" and > 50 feet long and lacks potential sources of LWD. Evidence of stream clean-out and/or management related debris flows.
	1) Pool Characteristics *	> 30% pool habitat by area. Little reduction in pool volume due to filling by fine sediment or unsorted substrates.	> 30% pool habitat by area but with obvious filling by fines or unsorted substrates or < 30% pool habitat by area and little reduction in pool volume due to filling.	< 30% pool habitat by area and obvious reduction in pool volume due to filling with fines and/or unsorted substrates.
	Off-channel Habitat *	Water velocity refugia present. Backwaters frequent and the result structural influence (LWD). Side channel connectivity maintained.		Little or no velocity refugia. Few or no backwaters, no off-channel ponds. Evidence of abandoned side channels due to past management activities.
	Refugia (important remnant habitat for sensitive aquatic species)	Habitat refugia exist and are adequately buffered (e.g. by intact riparian reserves); existing refugia are sufficient in size, number and connectivity to maintain viable populations or sub-populations.	Habitat refugia exist but are not adequately buffered (e.g. by intact riparian reserves); existing refugia are insufficient in size, number and connectivity to maintain viable populations or sub-populations.	Adequate habitat refugia do not exist.

FACTORS	INDICATORS	PROPERLY FUNCTIONING	AT RISK	NOT PROPERLY FUNCTIONING
Channel Condition and Dynamics	Width/Depth Ratio	W/D ratio and channel types are within historic ranges and site potential as per Rosgen typing.		W/D ratios and channel types are outside of historic ranges and site potentials.
	Streambank Condition *	Basinwide, in low gradient reaches > 90% stable; i.e. on average less than 10% of banks are actively eroding.	Basinwide, in low gradient reaches, streambanks 80 - 90% stable. Active erosion limited to outcurves.	< 80% of streambanks are stable. Active erosion widespread throughout basin in low gradient reaches.
	Floodplain Connectivity *	Off-channel areas are frequently hydrologically linked to main channel; overbank flows occur and maintain wetland function, riparian vegetation and succession.		Obvious reduction in hydrologic connectivity between off-channel, wetland, floodplain and riparian areas; wetland extent noticeably reduced and riparian vegetation/succession altered significantly.
Flow/Hydrology	Drainage Network	Little increase in drainage network due to roads.		Substantial increase in drainage network density due to roads (e.g. 20 - 25%)
Watershed Conditions	Road Density and Location	< 2 miles/square mile, with no valley bottom roads.	2 - 3 miles/square mile, with some valley bottom roads.	> 3 miles/square mile and/or substantial amount of valley bottom roads.
	Disturbance History	< 5% ECA/decade (entire watershed) with no concentration of disturbance in unstable or potentially unstable areas, and/or refugia, and/or riparian reserves.		Riparian Reserves are fragmented, poorly connected or provide inadequate protection of habitats and refugia for sensitive aquatic species. < 80% are in late seral condition.
	Landslide Rates	Within 20% of historic natural rates. Stream conditions not evidently altered due to management related landslides.		Not within 20% of historic natural rates. Stream conditions obviously altered by management related landslides.

1) Pool characteristics numerics are applicable to 3rd order or larger basins.

* Numeric values will be determined by measurements or estimates taken in low-gradient (< 2%) adjustable segments. These elements are not applicable if none are present.

Riparian Reserve Discussion - Impacts to RR based on ACS objectives.

NOTE: This discussion is based on a 180' Riparian Reserve width not 160' as is applicable in some watersheds.

ACS OBJECTIVE	SUMMARY OF ACS OBJECTIVE	POTENTIAL IMPACTS (beneficial and adverse)	MITIGATION
1*	Watershed & landscape scale features		Objective attained with emphasis on restoration.
2*	Spatial/temporal connectivity	Some short-term adverse impacts, but not sufficient enough to impact connectivity. In long-term, effects would likely be beneficial.	- 90' (from stream) no touch buffer on non-fish bearing and 180' on fish bearing (see FEMAT V26-27 for justification). - Do not clear around sugar pine closer than 200' of each other in the area outside the 90' or 180' no touch buffer (between 90'-180' or 180'-360' from stream, respectively).
3**	Physical integrity of aquatic system	1) Short term sedimentation impacting H_20 quality (from harvest). 2) Short term sedimentation due to consttuction of temporary roads. 3) Sedimentation from skid trails. 4) Increased sedimentation from all roads. 5) Disturbance in RR from yarding. 6) Increased sediment in channels (winter).	1) 90' (from stream) no touch buffer on non-fish bearing and 180' on fish bearing. 2) No mid-slope rd. locations, narrow rd. surfaces and low cuts. 3) Till existing skid trails (reduces sediment in long term & restores function). 4) Summer show. 5) No yarding across channel. 6) Renovate (money limited) using BMP's; seasonal restrictions; directionally fall from RR.
4*	Water quality	1) Building roads and skid roads in RR. 2) Impacts similar to objective 3 (above).	1) Do not build roads or skid roads within the RR. Existing skid roads through draws would not be used.
5**	Sediment regime	Same as objective 3 (above).	Same as objective 3 (above).
6*	Instream flows	1) Compaction due to hauling & yarding. 2) Increased peak flows due to reduced canopy closure (will happen only in areas of s.p. concentrations). 3) Removal of potential future DWD.	1) Till; seasonal restrictions (except what's done from existing rocked roads); one-end log suspension. 2) Layout (where concentrated, don't necessarily clear around all s.p.); do not remove vegetation (including trees) from anywhere else except around s.p. (in RR). 3) For "poor" s.p. and snags in RR, don't thin around and don't harvest the "poor" s.p. in RR.
7*	Floodplain inundation & water table elevation	1) Decrease of H_20 in the meadow or wetland.	1) Do not yard through; no harvest in these areas and do not construct roads.
8*	Species comp. & diversity of plant communities	Reduction of canopy in more concentrated s.p. areas (thermal regulation occurs within 100' of stream).	Do not clear around s.p. closer than 200' of each other within 90-180' of the buffered draw (nonfish-bearing); or within 180-360' of the buffered draw (fish-bearing.).
9*	Habitat to support populations of riparian dependent species.	1) Vascular plants = no impacts; survey & manage = potential short term adverse impacts; silviculture = short-term removes all brush and small trees & long-term revegetates; beneficial for s.p. maintenance in ecosystem and mimics low-intensity fire which would allow for early successional species to come back which is natural for the ecosystem; invertebrates/vertebrates = short-term adverse impacts due to harvest of trees & long-term beneficial impacts since it perpetuates successional events which maintain or create desired future conditions.	This objective would be maintained since the activity has beneficial impacts on habitat in the long-term and contributes to restoration of the s.p. population.

* Objective attained with application of mitigation (revised 7/28/97)

** Objective attained with application of mitigation and restored in some cases.

Habitat Bench Marks Related to Category Types

Pools	Bench Mark Weighing Scale 1-5	4-Excellent	3-Good	2-Fair	1-Poor	Row Totals
a) Pool Area %	2	≥ 45	30-44	16-29	≤ 15	
b) Residual Pool						
Small (1-3 ordered)	4	≥ 0.55	0.35 - 0.54	0.15 - 0.34	0 - 0.14	
Large (4th order and greater)	4	≥ 0.95	0.76 - 0.94	0.46 - 0.75	≤ 0.45	
Riffles						
a) Width/Depth (wetted) (ODFW)	3	≤ 10.4	10.5 - 20.4	20.5 - 29.4	≥ 29.5	
b) Width/Depth (bank full) (USFS)	3	≤ 10	11 - 15	16 - 19	≥ 20	
c) Silt/Sand/Organics (% area) (ODFW)	2	≤ 1	2 - 7	8 - 14	≥ 15	
d) Embeddedness (% by unit) (USFS)	2	0	1 - 25	26 - 49	≥ 50	
e) Gravel % (Riffles)	3	≥ 80	30 - 79	16 - 29	≤ 15	
f) Substrate dominant	3	Gravel	Cobble	Cobble	Bedrock	
subdominant (USFS)	2	Cobble	Large Boulder	Small Boulder	Anything	
Reach Average						
a) Riparian condition Species dom/subdom. (> 15 cm)	2	conifer/hdwd* Klam - hdwd*	conifer/hdwd* Klam - hdwd*	hdwd*/conifer	alder/anything	
Size (Conifers)	3	≥ 36" Klam - ≥ 24"	24 - 35" Klam - 12 - 23"	7 - 23"	≤ 6"	
b) Shade (%) (ODFW)						
Stream Width < 12 M	1	≥ 80	71 - 79	61 - 70	≤ 60	
Stream Width > 12 M	1	≥ 70	61 - 69	51 - 60	≤ 50	
LWD						
a) Pieces (lg/sm) 100 M Stream	3	≥ 29.5	19.5 - 29.4	10.5 - 19.4	≤ 10.4	
b) Vol/100 M Stream	2	≥ 39.5	29.5 - 39.4	20.5 - 29.4	≤ 10.4	
USFS - Pieces 50' or more long and 24" dbh per mile	5	≥ 70	45 - 69	31 - 44	≤ 30	
Temperatures	1	≤ 55	56 - 60	61 - 69	≥ 70	
Macroinvertebrates						
Totals for Category						

* Hardwood category does not include alder.

*Where USFS designations appear, either USFS or ODFW measurements may be used but not both.

HABITAT BENCHMARK RATING SYSTEM

100 - 82 EXCELLENT
81 - 63 GOOD
62 - 44 FAIR
43 - 25 POOR

Appendix D

Hydrology

Table D-1. Drainage Area and Area Above the Outflow of Each Drainage in the Canyonville/Canyon Creek WAU.

Drainage Name	Drainage Area (square miles)	Area Above Outflow (square miles)
Canyon Creek Subwatershed		
Bear Gulch	7.44	12.11
Canyon Pass^	4.67	4.67
Canyonville	2.20	37.66
Jordan Creek	8.11	147.68
Lower West Fork	8.30	35.46
South West Fork	7.06	15.05
Upper West Fork^	7.99	7.99
Portion of WAU in the **Shively O'Shea Subwatershed**		
Packard Gulch	7.27	96.37
South Umpqua Morgan^	3.17	3.17
Small Creek	5.54	101.91
Stinger Gulch	7.02	89.10

^ Denotes individual or headwater watershed

APPENDIX E

Wildlife

APPENDIX E

These steps were followed to reach the guides given in Table 25. It uses information gathered at the Resource Area level. Spotted owl site ranking and general suitable habitat evaluation are the two topics to consider when planning management activities affecting spotted owl suitable habitat.

A. Spotted Owl Site Ranking

1. Gathered information to create Table 18. Values given in Table 18 were from owl survey data and suitable habitat inventory data.

2. Table 18 contains information on historic and current owl sites. The owl sites best representing the territory locations were selected. Usually the number of potential sites is lower than the sum number of historical sites and current sites. The reason is that any one activity center can have more than one alternate location. Usually the area of these different alternate numbers overlap. Some have alternate numbers that are physically in a different drainage, subwatershed, ownership, or section.

3. Criteria steps **a** through **m,** listed below, were used to group the selected owl sites to determine the rankings.

Criteria list:

a) Areas where owl sites are **not** present should be considered first.

b) If sites cannot be avoided, then sites that have more than 1,000 acres of suitable habitat in the provincial radius and more than 500 acres in the 0.7 mile radius with occupancy and history rankings of "3" should be considered **second**.

c) Sites with less than 1,000 acres of suitable habitat in the provincial radius and less than 500 acres in the 0.7 mile radius with occupancy and history rankings of "3" should be considered **third**.

d) Sites with an occupancy ranking of "2" and a history ranking of "3" should be considered **fourth**.

e) Sites with an occupancy ranking of "3" and a history ranking of "2" should be considered **fifth**.

f) Sites with more than 1,000 acres of suitable habitat in the provincial radius and more than 500 acres in the 0.7 mile radius with occupancy and history rankings of "2" should be considered **sixth**.

g) Sites with less than 1,000 acres of suitable habitat in the provincial radius and less than 500 acres in the 0.7 mile radius with occupancy and history rankings of "2" should be considered **seventh**.

h) Sites with more than 1,000 acres of suitable habitat in the provincial radius and more than 500 acres in the 0.7 mile radius with an occupancy ranking of "1" and a history ranking of "2" should be considered **eighth**.

i) Sites with more than 1,000 acres of suitable habitat in the provincial radius and more than 500 acres in the 0.7 mile radius with an occupancy ranking of "2" and a history ranking of "1" should be considered **ninth**.

j) Sites with more than 1,000 acres of suitable habitat in the provincial radius and less than 500 acres in the 0.7 mile radius with an occupancy ranking of "1" and a history ranking of "2" should be considered **tenth**.

k) Sites with less than 1,000 acres of suitable habitat in the provincial radius and less than 500 acres in the 0.7 mile radius with an occupancy ranking of "1" and a history ranking of "2" should be considered **eleventh**.

l) Sites with less than 1,000 acres of suitable habitat in the provincial radius and less than 500 acres in the 0.7 mile radius with an occupancy ranking of "2" and a history ranking of "1" should be considered **twelfth**.

m) Sites with occupancy and history rankings of "1" should be considered **last**.

4. Projects meeting criteria **a,** which is removing or modifying suitable spotted owl habitat outside of known provincial territories should be considered first.

5. Owl territories meeting criteria **b** through **g** were grouped and given a ranking of **one**.

6. Owl territories meeting criteria **h** through **j** were grouped and given a ranking of **two**.

7. Owl territories meeting criteria **k** through **m** were grouped and given a ranking of **three**.

8. The following conditions apply to the individual rankings.

When it is not possible to avoid modifying or removing suitable habitat within a known territory, then sites with "go to" rank of "one" should be first, "two" should be second, and "three" should be last. The rank (Table 18) for any given owl site number gives a different purpose based on Land Use Allocation (LSR or Matrix). For example, a site with a final rank of "1" in Matrix should be considered as a potential area where harvest may occur first. Details of timing, location, and distance from core area would be determined by an ID Team and other staff evaluations.

Sites with a rank of "1" in the LSR portion of the WAU should be considered first for habitat evaluation. Details of timing, location, distance from core area, objectives, and treatment prescription would be determined by the ID Team or other staff evaluations.

B. Habitat Evaluation

The concept of habitat evaluation would be applied to the landscape while maintaining objectives for the various Land Use Allocations. Habitat evaluation would describe the timing, location, and spatial distribution of habitat removal or modification on Matrix lands in the WAU. Habitat evaluation may include topics like connectivity of mature and late-successional blocks to other similar blocks and their relationship to topography, the amount suitable habitat present around spotted owl sites, where the suitable habitat is located, the connectivity of suitable habitat, and the status of dispersal habitat. The function and objectives of critical habitat should be considered in areas where Critical Habitat Units overlap Matrix lands.

In the LSR portion of the WAU, the habitat evaluation would consider current forest age classes, future age classes, location, and connection to similar habitat within or between spotted owl territories across the landscape. This evaluation could locate LSR project areas and actions where manipulation of forest stands could aid reaching old-growth characteristics sooner than if left in the current condition.

Evaluation of the connectivity of suitable habitat would be done with the aid of a photo of the Canyonville/Canyon Creek WAU, seral age class maps, and ground inspection. This way the connection of late-successional blocks and the relationship to topography could be examined. Topography is important because knowing where connectivity is present or lacking and the relationship to riparian systems or uplands may make a difference on its success. Because of the checkerboard ownership, connectivity of the remaining older forest stands is very important. Even avian species capable of flight require connectivity of habitat for moving from one place to another. The ability to move within the forest from one place to another becomes more important to species that require or have dependency on older age classes, have small territories and move by crawling or walking across the ground.

The following is an example of steps to evaluate forest connectivity on the landscape. This example deals with owls but the process can be used for other species. This process should involve wildlife biologists, planning, and silviculture specialists.

1. Consider the ranking system. Keep in mind habitat acre thresholds of maintaining 500 acres within 0.7 miles, 1,335 acres within 1.3 miles, or 1,286 acres within 1.2 miles of a spotted owl activity center and LSR objectives. This data was presented in Table 18 in this watershed analysis.

2. Owl sites would be evaluated using the spatial arrangement of seral age classes within the provincial radii (1.2 or 1.3 miles) around an owl site. In the LSR, the purpose would be to locate suitable forest age classes, next to suitable habitat, where stand development toward late successional characteristics could be accelerated. On Matrix lands, the purpose would be to locate areas where manipulation may provide a functional forest corridor and coordinate the timing and spacing of harvest units.

3. Within the WAU, the connectivity of suitable spotted owl habitat within an owl site to other late successional habitat in the vicinity would be evaluated. Blocks of older age class stands (80 years old and

older) and how they are connected to other similar blocks would be analyzed. The following questions and comments would be reviewed and answered.

a. Does the provincial radii of owl sites contain forest stands suitable for harvest (Matrix) or manipulation (LSR/Matrix)? If the ranking table has been completed this information is already available.

b. Will manipulation of forest stands (LSR/Matrix) speed up attaining older age class characteristics to provide connectivity between owl sites and suitable spotted owl habitat?

c. Will timber harvesting of stands reduce connectivity between suitable owl habitat and adjacent habitat?

d. Will manipulation of the stand increase/decrease connectivity between suitable owl habitat and adjacent habitat, between the LSR and Matrix, between connectivity blocks?

e. Where is connectivity needed? In the upland or in the riparian area of the drainage? Both? Is the Riparian Reserve connection adequate to meet objectives?

f. Evaluate and select forest stands to leave without manipulation and likely pros and cons of such choice (in Matrix or LSR). This can lead to long-term connection across the landscape of older forest stands.

Table E-1. Special Status Wildlife Species in the Canyonville/Canyon Creek WAU.

SPECIES	STATUS	PRESENCE	MONITORING LEVEL
VERTEBRATES			
FISH			
Coho Salmon (Oncorhynchus kisutch)	FT, SC, AS	D	3
Umpqua Chub (Oregonighthys kalawatseti)	SoC, SV, BS	S	1
Umpqua Basin Cutthroat Trout (Oncorhynchus clarki clarki)	FE	D	3
Pacific Lamprey (Lampetra ayresi)	SoC, BS	D	3
Steelhead Trout (Oncorhynchus mykiss)	FP	D	3
AMPHIBIANS AND REPTILES			
Clouded salamander (Aneides ferrous)	SU, AS	D	3
Del Norte salamander (Plethodon elongatus)	S&M, SoC, SV, BS	U	3
Foothill yellow-legged frog (Rana boylii)	SoC, SV, BS	S	3
Northern Red-legged frog (Rana aurora aurora)	SoC, SU, BS	D	3
Southern Torrent salamander (Rhyacotriton variegatus)	SoC, SC, BS	S	3
Tailed frog (Ascaphus truis)	SoC, SV, BS	U	3
Western toad (Bufo boreas)	SV, BT	S	1
California Mountain kingsnake (Lampropeltis zonata)	SV, AS	S	1
Common kingsnake (Lampropeltis getulus)	SV, AS	S	1
Northwestern pond turtle (Clemmys marmorata marmorata)	SoC, SC, BS	D	3
Sharptail snake (Contia tenuis)	SV, AS	S	3
BIRDS			
Harlequin duck (Histrionicus histrionicus)	SoC, BS	U	1
Marbled murrelet (Brachyramphus marmoratus marmoratus)	FT, ST, CH	S	3
Bald eagle (Haliaeetus leucocephalus)	FT, ST	S	1
Northern goshawk (Accipiter gentilis)	SoC, SC, BS	S	3
Peregrine falcon (Falco peregrinus anatum)	FE, ST	S	4
Great gray owl (Strix nebulosa)	S&M, SV, AS	S	1
Northern spotted owl (Strix occidentalis caurina)	FT, ST, CH	D	4
Flammulated owl (Otus flammeolus)	SC, AS	U	1
Pygmy owl (Glaucidium gnoma)	SU	D	3

Table E-1. Special Status Wildlife Species in the Canyonville/Canyon Creek WAU.

SPECIES	STATUS	PRESENCE	MONITORING LEVEL
Northern Saw-whet Owl (Aegolius acadicus)	AS	S	1
Acorn Woodpecker (Melanerpes formicivorous)	SU	S	1
Lewis' woodpecker (Melanerpes lewis)	SC, AS	U	1
Pileated woodpecker (Dryocopus pileatus)	SV, AS	D	3
Little willow flycatcher (Empidonax traillii brewsteri)	SoC, BS	S	1
Purple martin (Progne subis)	SC, AS	D	3
Pygmy nuthatch (Sitta pygmae)	SV	U	1
Western bluebird (Sialia mexicana)	SV, AS	D	3
Oregon vesper sparrow (Pooecetes gramineus)	SC, BT	U	1
MAMMALS			
Fringed myotis (Myotis thysanodes)	SoC, SV, BS, S&M	S	3
Long-eared Myotis (Myotis evotis)	SoC, BS, S&M	D	3
Long-legged Myotis (Myotis volans)	SoC, BS, S&M	D	3
Pacific pallid bat (Antrozous pallidus)	S&M, SC, AS	D	3
Silver Haired Bat (Lasionycteris noctivagans)	BT	D	3
Townsend's big-eared bat (Corynorhinus townsendii)	SoC, SC, BS	S	3
Yuma Myotis (Myotis yumanensis)	SoC, BS	D	3
Ringtail (Bassariscus astutus)	SU	S	1
American marten (Martes americana)	SC, AS	S	1
Pacific Fisher (Martes pennanti pacifica)	SoC, SC, BS	U	1
California wolverine (Gulo gulo luteus)	SoC, BS	U	1
North American Lynx (Felis lynx canadensis)	S&M	U	1
White-footed vole (Arborimus albipes)	SoC, BS, SP	S	1
Red Tree Vole (Arborimus longicaudus)	S&M	D	3
INVERTEBRATES			
Blue-gray taildropper (Prophysaon coeruleum)	S&M	D	3
Oregon shoulderband (Helminthoglypta hertleini)	S&M	S	3
Oregon megomphix (Megomphix hemphilli)	S&M	S	3
Papillose taildropper (Prophysaon dubium)	S&M	D	3

Table E-1. Special Status Wildlife Species in the Canyonville/Canyon Creek WAU.

SPECIES	STATUS	PRESENCE	MONITORING LEVEL
Alsea ochrotichian micro caddisfly (Ochrotrichia alsea)	SoC, BS	U	1
Denning's agapetus caddisfly (Agapetus denningi)	SoC, BS	U	1
Vertree's ochrotichian micro caddisfly (Ochrotrichia vertreesi)	SoC, BS	U	1
Franklin's bumblebee (Bombus franklini)	SoC, BS	U	1

STATUS ABBREVIATIONS:	**PRESENCE ABBREVIATIONS**:
FE -- Federal Endangered	**D** -- Documented by surveys or identified in the field
FT -- Federal Threatened	**S** -- Suspected, habitat present
FP -- Federal Proposed	**U** -- Uncertain
FC -- Federal Candidate	
SoC-- Federal species of concern	August 14, 1997 RHEspinosa
CH -- Critical habitat designated	**MONITORING LEVELS USED TO DOCUMENT SPECIES:**
SE -- State Endangered	**N** -- No surveys done or planned
ST -- State Threatened	**1** -- Literature search only
SC -- ODFW Critical	**2** -- One field search done
SV -- ODFW Vulnerable	**3** -- Some surveys completed
SP -- ODFW Peripheral/Naturally Rare	**4** -- Protocol completed
SU -- ODFW Undetermined	
BS -- Bureau Sensitive Species (BLM) - This status reflects interim guidelines for former USFWS FC1 and FC2 species as per instruction communication from the Oregon state office (March 7,1996) and IM-OR-97-118 (April 30,1997).	
AS -- Bureau Assessment Species (BLM)	
BT -- Bureau Tracking species (BLM)	
S&M--Survey and Manage (ROD)	

Appendix F

Plants

Appendix F

Table F-1. Survey and Manage Plant Species Suspected to Occur in the Canyonville/Canyon Creek WAU.

Species	Survey Strategy			
	1	2	3	4
Vascular plants				
Allotropa virgata	X	X		
Aster vialis	X	X		
Bensoniella oregana	X	X		
Cypripedium fasciculata	X	X		
Cypripedium montanum	X	X		
Fungi				
Rare False Truffles				
Gautieria otthii	X		X	
False Truffles				
Rhizopogon truncatus			X	
Chanterelles				
Cantharellus cibarius			X	X
Cantharellus subalbidus			X	X
Cantharellus tubaeformis			X	X
Rare Resupinates and Polypores				
Otidea leporina			X	
Otidea onatica			X	
Otidea smithii	X		X	
Sarcosoma mexicana			X	
Rare Cup Fungi				
Aleuria rhenana	X		X	

Appendix F

Table F-1. Survey and Manage Plant Species Suspected to Occur in the Canyonville/Canyon Creek WAU.

Species	Survey Strategy			
	1	**2**	**3**	**4**
Lichens				
Rare Leafy (arboreal) Lichens				
Hypogymnia duplicata	X	X	X	
Rare Nitrogen-Fixing Lichens				
Nephroma occultum	X		X	
Pseudocyphellaria rainierensis	X	X	X	
Riparian Lichens				
Usnea longissima				X
Bryophytes				
Marsupella emarginata var. aquatica	X	X		
Ptilidium californicum (Liverwort)	X	X		

Survey Strategies:
1= Manage Known Sites
2= Conduct Surveys Prior to Activities and Manage Sites
3= Conduct Extensive Surveys and Manage Sites
4= Conduct General Regional Surveys

Appendix G

Roads

Table G-1. Roads in the Canyonville/Canyon Creek WAU to Consider Decommissioning.

Road Number	Miles	Subwatershed
31-5-2.01C	0.10	Canyon Creek
31-5-12.01A	0.19	Canyon Creek
31-5-15.01A	0.20	Canyon Creek
31-5-18.00A	0.31	Canyon Creek
31-5-19.00B	0.16	Canyon Creek
31-5-21.02A	0.13	Canyon Creek
31-5-24.00B	0.39	Canyon Creek
31-5-28.00A	0.50	Canyon Creek
31-5-28.01B	0.08	Canyon Creek
30-5-10.00A	0.49	Portion of WAU in Shively-O'Shea
30-5-10.01A	0.31	Portion of WAU in Shively-O'Shea
Total	2.86	

Table G-2. Roads Which Could Either Be Decommissioned or Improved in the Canyonville/Canyon Creek WAU.

Road Number	Miles	Subwatershed
31-5-10.01B	0.50	Canyon Creek
Total	0.50	

Table G-3. Roads to Consider Improving in the Canyonville/Canyon Creek WAU.

Road Number	Miles	Subwatershed
30-5-31.00D3	0.15	Canyon Creek
30-5-31.00F	0.56	Canyon Creek
31-4-19.01A	0.87	Canyon Creek
31-4-19.02A	0.48	Canyon Creek
31-5-10.00A	1.20	Canyon Creek
31-5-12.00B	0.45	Canyon Creek
31-5-12.00D	0.42	Canyon Creek
31-5-13.00D	1.87	Canyon Creek
31-5-13.01A	4.47	Canyon Creek
31-5-14.00A	0.51	Canyon Creek
31-5-14.03A	0.25	Canyon Creek
31-5-19.03A	0.40	Canyon Creek
31-5-21.03A	1.69	Canyon Creek
31-5-21.04A	0.43	Canyon Creek
31-5-22.02A	1.24	Canyon Creek
31-5-22.03A	3.35	Canyon Creek
31-5-24.00E2	0.36	Canyon Creek
31-5-24.00G	0.53	Canyon Creek
31-5-27.00A	0.93	Canyon Creek
31-5-34.00A	1.92	Canyon Creek
31-5-35.00H	0.15	Canyon Creek
31-5-35.00J	0.66	Canyon Creek
31-6-24.00A	2.49	Canyon Creek
31-6-26.01B	0.30	Canyon Creek

Road Number	Miles	Subwatershed
32-5-3.00A	1.76	Canyon Creek
29-4-32.00C	0.47	Portion of WAU in Shively-O'Shea
29-4-32.00D	0.25	Portion of WAU in Shively-O'Shea
29-4-32.00F	0.30	Portion of WAU in Shively-O'Shea
30-4-6.00A	0.63	Portion of WAU in Shively-O'Shea
30-4-6.00C	0.95	Portion of WAU in Shively-O'Shea
30-5-1.00A	0.95	Portion of WAU in Shively-O'Shea
30-5-1.01A	0.44	Portion of WAU in Shively-O'Shea
30-5-1.02A	0.26	Portion of WAU in Shively-O'Shea
30-5-14.00A	2.48	Portion of WAU in Shively-O'Shea
30-5-14.00B	1.43	Portion of WAU in Shively-O'Shea
30-5-15.00A	0.39	Portion of WAU in Shively-O'Shea
30-5-24.00H	0.10	Portion of WAU in Shively-O'Shea
30-5-24.00I	0.20	Portion of WAU in Shively-O'Shea
30-5-31.00D3	0.15	Portion of WAU in Shively-O'Shea
30-5-31.00F	0.56	Portion of WAU in Shively-O'Shea
30-5-33.00E	0.65	Portion of WAU in Shively-O'Shea
Total	37.65	

Map G-1. Canyonville/Canyon Creek WAU
Potential Road Treatments